

**AN ASSESSMENT OF THE QUALITY OF PUBLIC AND
GROUP SCHEME GROUNDWATER SUPPLIES IN COUNTY
LAOIS (First Draft)**

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An Assessment of the Quality of Public and Group Scheme Groundwater Supplies in County Laois

1. Introduction

1.1. Objectives and Intended Readership

This report aims to provide an overview of the groundwater quality characteristics of public and group scheme supply sources in County Laois. In particular, the objectives of the report are to:

- Compile readily available groundwater quality data for most of the public and group scheme supply sources in County Laois.
- Identify the ‘natural’ causes of variations in water quality.
- Identify the regional-scale potentially-polluting human activities which are considered to have affected water quality across the county.
- Recommend actions with regard to water quality problems or with regard to on-going water quality monitoring programmes.

For the purposes of this report, the term ‘groundwater quality’ will relate to both bacteriological and inorganic hydrochemical parameters. The organic chemistry of the groundwater is not considered, primarily because of a lack of data.

The potentially polluting activities considered are those which are likely to influence water quality patterns, and are as follows:

- Landspreading.
- On-site waste disposal systems (e.g. septic tank systems).
- Farmyards.

Landspreading is considered because it is carried out over large areas. The remaining two are considered because, though the areas of individual cases are small, they are widely distributed throughout the county. All three relate to domestic or agricultural activities.

Clearly, there are many other types of potentially polluting activity, such as manufacturing industry and small commercial enterprise. Though individual pollution incidents related to these activities can be serious in terms of public health, they are generally likely to be localised, and will not influence the regional groundwater quality situation across the county. Consequently, such activities are not considered in this report. Further, due to the limited availability of data on organic parameters (e.g. data on petroleum hydrocarbons), adequate assessments cannot be made of these activities within the scope of this report.

The report is intended for use by engineers, planners, regulators, and hydrogeologists who are considering regional-scale distribution of water quality across the county. It is not suitable for use in identifying specific issues at specific water supply sources, unless augmented by field-based hazard assessments at the supply sources in question.

1.2. Scope and Methodology

1.2.1. Background Analytical Principles

Data on water quality have been used in this report to enhance the current understanding of:

- The natural groundwater flow regime in the vicinity of the groundwater supply sources.
- The main domestic and agricultural hazards to the regional pattern of groundwater quality.

Interpretations of the natural groundwater flow regime were based on the ‘major ion’ chemistry of the samples available. Major ions are the dominant dissolved species in groundwater. They include calcium, magnesium, sodium, potassium, bicarbonate, sulphate, chloride, and nitrate. An examination of the ‘major ion’ chemistry of groundwater samples is often ignored in favour of parameters such as bacteria, which are more directly linked to human health issues. However a study of the ‘major ion’ chemistry will provide a water quality categorisation, or ‘chemical signature’ for each supply source. This signature can prove useful in the assessment of the overall groundwater flow regime across the county, as well as giving indirect indications of areas of lower groundwater vulnerability. For example, elevated levels of magnesium or sodium in relation to calcium can indicate the presence of slow groundwater flow systems and inhibited recharge. Such areas will tend to be less vulnerable to groundwater pollution. The ‘major ion’ chemistry can also give engineers valuable information on scaling or corrosion potential, as well as providing additional information on contamination derived from human activities (e.g. using chloride or nitrate).

Interpretations of the main domestic and agricultural influences on the regional pattern of groundwater quality were based on nitrates, chloride, phosphates, ammonia, E.coli / faecal coliforms, potassium, sodium, iron and manganese data. These are considered the key indicators of contamination by agricultural activities and domestic wastes. Levels were compared graphically with European Union Maximum Admissible Concentrations (MACs) and with GSI recommended threshold levels. These threshold levels can be used to identify sources where significant contamination may be occurring. Levels falling between the threshold and MAC concentrations indicate the presence of contamination, but not, in the strictest sense of the word, ‘pollution’. This issue is discussed further in Appendix A.

1.2.2. Data Acquisition and Reduction

The data used in this report were taken from a ‘trawl’ of readily-available data on bacteriological and inorganic chemical data between the start of 1995 and the end of 1999. Data sources examined were the EPA (Environmental Protection Agency), the Local Sanitary monitoring authority, and specific sampling organised by the Geological Survey of Ireland (GSI). A detailed examination of other, less readily-available data sources such as individual academic theses or consultants’ reports, was beyond the scope of this report.

Data was compiled from the following sources:

- Sanitary Authority monitoring in 1997, as submitted to the EPA. Data supplied by the Environmental Protection Agency (EPA).
- Sanitary Authority monitoring in 1998, as submitted to the EPA. Data supplied by the Environmental Protection Agency (EPA).
- Geological Survey of Ireland and Midland Health Board sampling in December 1997 and June-July 1999. Analysis of major ions and heavy metals was carried out by the State Laboratory in Abbotstown, County Dublin. Analysis of total coliforms and E.coli was undertaken by the Midland Health Board in Portlaoise.
- EPA monitoring between 1995 and 1998.
- EPA compilation of nitrates data up to and including 1995 (EPA, 1997).

The sanitary authority and EPA data were ‘screened’ as follows:

- The results of the two GSI/Midland Health Board groundwater monitoring rounds in 1997 and 1999 were used as the baseline, standard set of supply sources and supply source names. Any Sanitary Authority and EPA data from supply sources which could not be readily correlated with the GSI baseline were not included. This generally occurred where names not known to the Midland Health Board or the GSI were used, or where one name was used to apply to several sources.
- Any Sanitary Authority and EPA data from supply sources absent from the baseline data-set were not included (e.g. the Clonaslee source).
- Sanitary Authority data on total coliforms, faecal coliforms and E.coli were not included if levels were non-detectable, as it was assumed that samples were taken from treated waters. In treated samples, levels of bacteria are not of value in determining contamination and contaminant origin unless they are above detection.
- Sanitary Authority samples were also not included if they were taken from water supply schemes fed from more than one water source. This is because it was assumed that the samples taken were of 'mixed' waters which would not be representative of any one source. For example, Abbeyleix is supplied by Aughfeerish, Five Wells, and Max Well. A sample from the mixed flow would reveal very little about the water quality patterns at each individual source.

1.2.3. Groundwater Supply Sources Studied

Table 1 provides a list of the supply sources considered, along with alternative Local Authority or EPA names. Certain sources have several names, and matching EPA terminology with local names and Local Authority names have proved problematic. The list represents the GSI's best attempt at reconciling these differences.

2. Compilation of Groundwater Quality Data

A summary of the major ion chemical data from sampling by the GSI and Midland Health Board in 1997 and 1999 can be found in Section 3.

The available data on domestic or agricultural indicators of contamination has been presented for each source in Section 4 and Figures 1 to 50.

A summary of all data compiled and used in this report is presented in Appendices B to E:

- Appendix B: Results of GSI and Midland Health Board sampling in 1997 and 1999.
- Appendix C: Summary of Local Sanitary Authority sampling results from 1997 (EPA format).
- Appendix D: Summary of Local Sanitary Authority sampling results from 1998 (EPA format).
- Appendix E: Summary of EPA sampling data from 1995 to 1998.
- Appendix F: Summary of 1995 EPA compilation data from the Laois Nitrates Report (EPA, 1997).

Table 1: Inventory of Groundwater Supply Sources under Consideration

Supply Source Name Used in this Report	EPA Plot Number ¹	Local Authority Supply Scheme	Public/Group Scheme	Population Served	Rate m ³ /d	Treatment Process
Aughfeerish	2	Abbeyleix	PWS	2000	900	Chlorination/fluoridation.
Five Wells, Abbeyleix	1					
Max Well	3					
Arless	4	Arless	PWS	40	10	Chlorination
Attanagh GWS.	-	Attanagh	GWS	105	40	None
Ballinabranagh	-	Ballinabranagh	GWS	800	100	None
Cloghogue Springs, Ballinakill	-	Ballinakill	PWS	500	275	Chlorination
Fermoyle, Ballinakill	-		PWS			
Lough, Ballybrittas	-	Ballybrittas	GWS	150	na	Chlorination
Tulloree, Ballyroan	9	Ballyroan	PWS	650	450	Chlorination
Barrow House	-	Barrowhouse	GWS	205	165	None
Byrnes, Borris-in-Ossory	-	Borris-in-Ossory	PWS	500	150	Chlorination
Cavanagh's, Borris-in-Ossory	-					
Derrin, Borris-in-Ossory	-					
Townspark, Borris-in-Ossory	10					
Coolenagh	13	Coolenagh	PWS	25	6	Chlorination
Coolfin, Ballacolla	-	Coolfin, Ballacolla	GWS	274	240	None
Cullahill GWS.	-	Cullahill	GWS	325	275	Chlorination
Dairyhill, Ballacolla	-	Dairyhill, Ballacolla	GWS	142	na	None
Donaghmore GWS.	37 ²	Donaghmore	GWS	180	90	None
Durrow Convent	14	Durrow	PWS	1100	370	Chlorination
Fermoyle, Durrow	39 ³		PWS			
Emo	16	Emo	PWS	450	200	Chlorination
Errill A GWS.	-	Errill	GWS	725	120	Chlorination
Errill B GWS.	-					
Killeaney GWS.	-	Killeaney	GWS	75	na	Chlorination
Killenard GWS.	-	Killenard	GWS	900	300	Chlorination
Derryguile	19	Mountmellick	PWS	3200	1200	Chlorination/fluoridation.
Drim, Mountrath ⁴	-	Mountrath	PWS	2500	1000	Filtration/ chlorination/fluoridation.
Knocks Bore, Mountrath	-					
Knocks Spring, Mountrath	-					
Mountsaalem GWS.	-	Mountsaalem	GWS	45	<40	None
Lough, Portarlinton	-	Portarlinton	PWS	3500	1900	Chlorination/fluoridation.
Ballydavis 1	-	Portlaoise	PWS	10500	4300	Sand filtration/ Chlorination
Ballydavis 2	-					
Darkin Well/Straboe	23					
Ralish GWS.	-	Ralish	GWS	40	<40	None
Rathdowney WW2B	-	Rathdowney	PWS	1100	450	Filtration/ Chlorination
Rosenallis	26	Rosenallis	PWS	50	24	Chlorination
Roundwood GWS.	-	Roundwood	GWS	na	na	na
Shanahoe, Ballacolla	-	Shanahoe, Ballacolla	GWS	418	366	None
Shanbeg, Rosenallis	-	Shanbeg [Rosenallis]	PWS	20	5	Chlorination
Kyle	17	Stradbally	PWS	1300	350	Chlorination
The Heath	32	The Heath	GWS	860	110	Chlorination
The Strand	-	The Strand	PWS	30	10	Chlorination
The Swan	28	The Swan	PWS	1000	500	Chlorination
The Orchard, Timahoe	29	Timahoe	PWS	400	200	Chlorination
Tinraheen, Ballacolla	-	Tinraheen, Ballacolla	GWS	274	240	None
Ballypickas GWS	-	Unknown	Assume GWS			
Meelick	-	Unknown	Assume PWS			

¹ Reference used in 'Nitrates in Groundwater. County Laois' (EPA, 1997).

² EPA data refers to a borehole termed 'Donaghmore'. Though the grid reference in the EPA report is different from the grid reference of the borehole termed 'Donaghmore' by the GSI, they are assumed to represent the same sampling point.

³ EPA data refers to a borehole termed 'Fermoyle'. Though the grid reference in the EPA report is different from the grid reference of the borehole termed 'Fermoyle, Durrow' by the GSI, they are assumed to represent the same sampling point. Note that 'Fermoyle, Ballinakill' lies immediately adjacent to 'Fermoyle, Durrow'.

⁴ Drim is marked on some maps as a surface water supply, but was switched to a borehole supply in mid 1997.

3. Natural Groundwater Quality Characteristics

3.1. Introduction

This section will first discuss the results from all 50 of the supply sources studied. Subsequently, the sources will be divided according to broad rock type categories, and the characteristics of waters in each rock type examined.

The data presented in this section comprises an average of the two sets of major ion chemistry results from the GSI/Midland Health Board sampling rounds in December 1997 and June/July 1999. The two sets of results are presented in full in Appendix B.

3.2. General ‘Natural’ Water Quality Characteristics

Of the 50 supply sources sampled, 49 have a ‘calcium-bicarbonate’ chemical signature. This essentially means that calcium and bicarbonate are the dominant major ions (refer to Section 1.2). This type of signature is typical of groundwater in Ireland – especially in limestone areas or in areas of limestone-rich subsoils. Consequently, the presence of such a signature does not significantly aid the interpretation of groundwater flow patterns in a region such as Laois where limestone is the dominant rock type.

The remaining supply falls into the more unusual ‘calcium-magnesium-bicarbonate’ category. The source is ‘The Swan’, and the signature is thought to be diagnostic of ‘ion exchange’ processes in the layered bedrock sequence of the Castlecomer Plateau (Misstear et al., 1980). Evidence of this type of process is rare in Ireland, and usually indicates much less vulnerable groundwater with slower, longer flow pathways. In this regard, it is interesting to note that The Swan is the only source of the 50 studied with non-detectable nitrate levels. This is despite the fact that the presence of elevated ammonia levels (regularly between 0.1 mg/l and 0.15 mg/l) indicate that a source of nitrogen is readily available. It is considered that this ammonia does not come from human activities but is derived naturally from the shales and/or coals that are present in the Castlecomer rock sequence.

Of the 50 supplies sampled, waters in 60% could be described as ‘very hard’, 30% as ‘hard’, 4% as ‘moderately hard’, 4% as ‘slightly hard’ and 2% (i.e. 1 supply source) as ‘moderately soft’. The criteria for these groupings is presented in Table 2b.

Iron concentrations ranged from 0.3 mg/l to non-detectable (i.e. less than or equal to 0.005 mg/l). Typical concentrations were in the order of 0.01 mg/l. Results from 8 out of the 50 supply sources were non-detectable in both sampling rounds.

Sulphate concentrations ranged from 4 mg/l to 61 mg/l, but were typically of the order of 15 to 20 mg/l.

Chloride concentrations ranged from 8 mg/l to 37 mg/l, but were typically of the order of 15 to 20 mg/l.

3.3. Comparison of Natural Groundwater Quality and Rock Type at Selected Supply Sources

Thirty-nine of the fifty sources sampled have been classified according to four broad rock type categories:

- Upper Carboniferous sandstones and mudstones: 15 supply sources.
- Clean or dolomitised limestones: 14 supply sources.
- Muddy Carboniferous limestones: 7 supply sources.
- Devonian sandstones and mudstones: 3 supply sources.

A summary of the main water quality characteristics of each of these rock types is presented in Table 2.

Table 2a: Variation in Chemical signature between Each Rock Unit Category.

Rock Unit Category	Number of Supply Sources in Each Category	Number of Supply Sources in each Chemical signature Category	
		Calcium-bicarbonate	Calcium-magnesium-bicarbonate.
Upper Carboniferous sandstones and mudstones	7	6	1
Clean or dolomitised Carboniferous limestones	14	14	0
Muddy Carboniferous limestones	15	15	0
Devonian sandstones and mudstones	3	3	0
Total (including the eleven non-classified sources)	50	49	1

Table 2b: Variation in Hardness between Each Rock Unit Category.

Rock Unit Category	Number of Supply Sources in Each Category	Number of Supply Sources in each Hardness (mg/l CaCO ₃) Category					
		Very Hard (more than 350 mg/l CaCO ₃)	Hard (251 – 350 mg/l CaCO ₃)	Moderately Hard (151-250 mg/l CaCO ₃)	Slightly Hard (101-150 mg/l CaCO ₃)	Moderately Soft (51-100 mg/l CaCO ₃)	Soft (less than 50 mg/l CaCO ₃)
Upper Carboniferous sandstones & mudstones	7	3 (43%)	3 (43%)	1 (14%)			
Clean or dolomitised Carboniferous limestones	14	7 (50%)	7 (50%)				
Muddy Carboniferous limestones	15	12 (80%)	3 (20%)				
Devonian sandstones and mudstones	3			1 (33%)	1 (33%)	1 (33%)	
Total (including the eleven non-classified sources)	50	30 (60%)	15 (30%)	2 (4%)	2 (4%)	1 (2%)	0

Table 2c: Typical Major Ion Concentrations in Each Rock Unit Category.

Rock Unit Category	Median Concentration for Each Rock Unit Category (mg/l) ⁵										
	Ca	Mg	Na	K	Alk	SO ₄	Cl	EC	Fe	Mn	NH _x
Upper Carboniferous sandstones and mudstones	120	10	9	2	310	10	20	620	0.02	<0.005	<0.015
Clean or dolomitised Carboniferous limestones	110	10	9	2	300	20	20	610	0.01	<0.005	<0.015
Muddy Carboniferous limestones	130	10	10	3	350	30	20	680	0.01	<0.005	<0.015
Devonian sandstones and mudstones	40	3	6	2	120	8	12	270	0.01	<0.005	<0.015
Total (including the eleven non-classified sources)	120	10	9	2	330	20	20	650	0.01	<0.005	<0.015

⁵ Ca: Calcium. Mg: Magnesium. K: Potassium. Na: Sodium. Alk: Alkalinity (as CaCO₃). SO₄: Sulphate. EC: Conductivity (µS/cm). Fe: Total Iron. Mn : Manganese. NH_x: Ammonia.

Thus, the waters in the two limestone categories are ‘hard’ or ‘very hard’ and have a chemical signature which is typical Irish groundwaters. The available data suggest that groundwaters in the Devonian sandstones generally have a similar chemical signature, but are slightly softer than the limestones. There is potential for longer, slower groundwater flow patterns and for higher ‘natural’ levels of iron in the Upper Carboniferous Sandstones and Mudstones.

3.4. Summary of ‘Natural’ Groundwater Characteristics.

An examination of the data from two sampling rounds encompassing 50 water supply sources in Laois suggests the following:

- The dominant chemical signature in the 50 sources under consideration is ‘calcium-bicarbonate’. This is typical of Irish groundwaters.
- Waters in the limestone supply sources are hard or very hard. Therefore, lime scale is likely to be a problem. Waters in the Devonian sandstone sources are moderately hard to moderately soft.
- Sulphate and chloride concentrations are typical of Irish groundwaters in the Midlands.
- Iron, potassium, manganese and ammonia concentrations are generally low, but may cause problems in specific supply sources, particularly in the Upper Carboniferous sandstones and mudstones.

4. Indicators of Groundwater Contamination

4.1. Introduction

As human activities have had some impact on a high proportion of groundwater in Ireland, there are few areas where the groundwater is in pristine condition. Consequently most groundwater is contaminated to some degree although it is not necessarily polluted. In assessing groundwater quality, there is often a tendency to focus only on the EU maximum admissible concentrations (MAC). In the view of the GSI, there is a need for assessment of the degree of contamination of groundwater as well as showing whether the water is polluted or not. This type of assessment can indicate where appreciable impacts are occurring. Consequently, thresholds for certain parameters can be used to help indicate situations where significant contamination but not pollution is occurring. The thresholds used by the GSI for assessing water quality are given below.

Parameter	GSI Threshold (mg/l)	EU MAC (mg/l)
Nitrate	25	50
Potassium	4	12
Chloride	30	250
Ammonia	0.15	0.4
K/Na ratio	0.3	
Faecal bacteria	0	0

These thresholds have been taken from Daly (1996). Other parameters which can also be useful indicators of contamination include ortho-phosphate (threshold 0.02 mg/l, MAC 5 mg/l), manganese (MAC and threshold of 0.05 mg/l) and iron (MAC and threshold of 0.2 mg/l).

The key indicators of domestic and agricultural contamination for each supply source are plotted in Figures 1 to 50, along with the corresponding MAC and GSI threshold levels. Further information on the use of these parameters in assessing groundwater quality is given in Appendix A.

All available data from 1995 to 1999 for the 50 supply sources listed in Table 1 were used in this assessment.

4.2. General Groundwater Quality Assessment of Supply Sources

The supply sources were divided into four groups to aid in the water quality assessment. The classification is based on concentrations of key contaminant indicators in relation to the European Union Maximum Admissible Concentration (MAC) and to the GSI threshold levels.

- **Group 1:** Sources in which one or more contaminant indicators in the available data set exceeded the MAC and which are therefore considered to have been polluted at the time of sampling.
- **Group 2:** Sources which show concentrations of the contaminant indicators chloride, nitrate, ortho-phosphate, iron, manganese and potassium:sodium ratio in excess of the GSI threshold levels. Some interpretation is required as levels in excess of these thresholds can reflect natural conditions in some cases (e.g. elevated potassium and/or iron can occur naturally in sandstone groundwaters).
- **Group 3:** Sources with slight anomalies in the analyses which may be naturally induced or indicative of some slight contamination. These are, however, inconclusive with the current data set.
- **Group 4:** Sources showing no evidence of contamination from the analyses carried out for the project.

The public supply sources are listed under each of the four groups in Table 3. The assessment has been made on the basis of information summarised for each supply source in Figures 1 to 50.

Table 3 is intended to help:

- Summarise the large amount of water quality data available.
- Identify those parameters where exceedances of drinking water limits or GSI threshold limits have occurred most commonly.
- Prioritise supply sources for remedial action. This prioritisation process is demonstrated in the Conclusions (Section 5) and Recommendations (Section 6).

Table 3 Groundwater Quality Classification of Co. Laois Groundwater Supply Sources

Group ⁶	Supply Source	Exceedances by Key Indicators of Contamination ⁷								
		NO ₃	Cl	PO ₄	NH _x	E.coli ⁸	K	K:Na Ratio	Fe	Mn
1	Arless.	<i>Excess threshold</i>	<i>Excess threshold</i>			excess MAC	excess MAC	<i>Excess threshold</i>		
	Emo.	<i>Excess threshold</i>				excess MAC		<i>Excess threshold</i>	excess MAC	
	Shanahoe (Ballacolla), Cloghogue (Ballinakill), Cullahill.	excess MAC				excess MAC		<i>Excess threshold</i>		
	Darkin Well, 5 Wells.	<i>Excess threshold</i>				excess MAC			excess MAC	
	Errill B., Shanbeg (Rosenallis), Dairyhill (Ballacolla), Coolfin (Ballacolla).	<i>Excess threshold</i>				excess MAC		<i>Excess threshold</i>		
	Killeaney.	excess MAC				excess MAC				
	Attanagh.	excess MAC						<i>Excess threshold</i>		
	Killenard, Tinraheen (Ballacolla), Kyle.	<i>Excess threshold</i>				excess MAC				
	Cavanagh's (Borris-in-Ossory).					excess MAC		<i>Excess threshold</i>		
	Barrow House, Fermoy (Ballinakill).	excess MAC								
	Rosenallis.				excess MAC	excess MAC				
	Lough (Ballybrittas), Mountsalem, The Heath, Derrin (Borris-in-Ossory), The Orchard (Timahoe).					excess MAC				
	Ballinabranagh, Donaghmore.					excess MAC			excess MAC	
	Knocks Spring (Mountrath), Aughfeerish (Abbeyleix).							<i>Excess threshold</i>	excess MAC	
2	Ballydavis 1 and 2 ⁹ , Durrow Convent, Max Well, Ralish, Tullore (Ballyroan).	<i>Excess threshold</i>								
	Fermoy (Durrow).	<i>Excess threshold</i>						<i>Excess threshold</i>		
	Roundwood, Knock Bore (Mountrath).							<i>Excess threshold</i>		
	Coolenaugh.			<i>Excess threshold</i>						
3	Ballypickas, Byrnes (Borris-in-Ossory), Errill A, Derryguile, Drim (Mountrath), Lough (Portarlinton), Meelick, Rathdowney, Townspark, The Swan ¹⁰ , The Strand.									
4	None.									

⁶ Note that Selenium was detected slightly above the MAC in June 1999 samples from the following sources: Byrnes (Borris-in-Ossory), Dairyhill (Ballacolla), Errill A, Errill B, Ralish, Derrin (Borris-in-Ossory), and Townspark (Borris-in-Ossory). Cadmium was detected slightly above the MAC in June 1999 samples from Ballydavis 2, and Five Wells (Abbeyleix). Fluoride was detected above the detection limit in a sample from the Lough (Portarlinton). These compounds, though important in human health considerations, are not major factors in assessing sources of agricultural or domestic contamination. As such, these results have not been used in assessing groupings outlined in Table 3.

⁷ NO₃: Nitrate. Cl: Chloride. PO₄: Phosphate. NH_x: Ammonia. K: Potassium. K:Na ratio: potassium:sodium ratio. Fe: Total Iron. Mn : Manganese. NH_x: Ammonia.

⁸ These figures represent untreated samples and treated samples where e.coli or faecal coliforms were detectable. As such, though useful in terms of identifying contamination sources, they are not necessarily indicative of human health concerns.

⁹ Ballydavis 1 has both available nitrate results close to, or in excess of the GSI threshold. Nitrate levels in Ballydavis 2 are 10-15 mg/l lower in both available samples, but both manganese results are in excess of the MAC. As the supplies are close together, it is assumed that these results reflect a common contaminant origin and, consequently, they are grouped together.

¹⁰ The Swan has levels of manganese and iron consistently in excess of the MAC. The Strand has one of the two available manganese data points in excess of the MAC. However, levels of nitrate, chloride, untreated E.coli and the potassium:sodium ratio are otherwise low and it is thought that the iron and manganese levels are naturally-derived, or derived from borehole casing materials. As such, both supplies have been 'downgraded' from Group 1 to Group 3.

Accordingly, Table 3 contains some valuable summary information on problem supplies. A few key points arising from this information are summarised below:

- i. Twenty-nine supply sources lie within the Group 1 categorisation (58% of the total). This represents 45% of Public supply sources and 79 % of Group Scheme supply sources.
- ii. Of the twenty-nine Group 1 sources, seven had at least two contaminant indicators in excess of the MAC and at least two contaminant indicators in excess of the GSI threshold. These were Arless, Cullahill, Emo, Shanahoe, Cloghogue, Darkin Well, and Five Wells. These are considered the most contaminated supply sources of the 50 sampled.
- iii. E.coli or faecal coliforms were in excess of the MAC (and GSI threshold) in twenty-four supply sources (48% of the total). This figure can be broken down into 35% of the public supply sources and 68% of the group scheme supply sources in question. However nine out of the twenty-four had less than three sample results available and eight had an exceedance in only one sample. Some care should be taken when analysing such a sparse data set.

Consequently, the data was ‘screened’ such that the main focus was concentrated on supply sources where results were ‘regularly’ above the MAC for faecal coliforms. For the purposes of this report, ‘regularly’, constituted more than 50% of the total number of sample results available. In order to include as much of the available data as possible, supplies where only two results were available were included in this category if exceedances occurred in both samples.

Levels in thirteen of the twenty-four supplies could be described as being ‘regularly’ above the faecal coliform MAC. These sources were Arless, Cloghogue, Coolfin, Cullahill, Emo, Errill B, Dairyhill, Killeaney, Killenard, Mountsalem, Shanahoe, The Heath, and Tinraheen. These results indicate the presence of nearby releases of, perhaps, faecal bacteria, viruses, or cryptosporidium into the subsurface (refer to Appendix A). Further, though landspreading of manure and slurry can pollute groundwater in extremely vulnerable areas with faecal bacteria, the primary origins of this type of contamination are generally septic tank systems and organic wastes in farmyards.

- iv. Group 2 sources constituted 20% of the total.
- v. Group 3 sources constituted 22% of the total.
- vi. Nitrate was in excess of the MAC in seven supply sources (14% of the total). Nitrate was ‘regularly’ in excess of the GSI threshold (i.e. more than 50% of the total number of sample results available in excess of the threshold) in a total of eighteen supply sources (36% of the total). Nitrate data are discussed in more detail in Section 4.3.
- vii. Potassium:sodium ratios were in excess of the GSI threshold in seventeen supply sources (34% of the total). This figure can be broken-down into 32% of the public supply sources and 37% of the group scheme supply sources in question. Of these seventeen supply sources, levels in nine could be described as being ‘regularly’ above the GSI threshold of 0.4 (i.e. more than 50% of the total number of sample results available in excess of 0.4). These supplies were Attanagh, Cullahill, Shanahoe, Cloghogue, Errill B, Dairyhill, Cavanagh’s (Borris-in-Ossory), Arless, and Roundwood. Potassium:sodium ratios in excess of 0.4 provide evidence of ‘point source’ farmyard (or landfill)-derived contamination from soiled water and other wastes derived from plant organic matter (refer to Appendix A).
- viii. Ammonia was found in excess of the GSI threshold in only one supply source: Rosenallis. At this supply, the level was considerably greater than the MAC in one sample, but below, or close to, detection limits in the other five sample results available. Elevated ammonia is

generally thought to indicate contamination by organic wastes released from septic tank systems or farmyards. This type of release is supported by the fact that the elevated ammonia corresponds with the presence of elevated E.coli results from the same sample. However, the available ammonia and E.coli data from Rosenallis suggest that the origin of the ammonia has been removed, or is intermittent.

- ix. Chloride was found in excess of the GSI threshold in only one supply source: Arless. At the levels in question in the Midlands of Ireland (40 mg/l to 80 mg/l), chloride generally indicates contamination by organic wastes released from septic tank systems, farmyards or potassium fertilisers. However, the elevated potassium:sodium ratios, and E.coli data that accompany the chloride data suggest that farmyard-derived contamination is one of the main, and perhaps the only, pollution hazard at this source.
- x. Iron and/or manganese was found in excess of the MAC (and GSI threshold) in ten supply sources (20% of the total). Three of these sources – Emo, Knocks Spring and Augheerish - also had elevated potassium:sodium ratios, and it may be that the elevated iron levels in these supplies are associated with the breakdown of high BOD organic wastes from farmyards (refer to Appendix A).
- xi. Of the ten supplies with elevated iron and/or manganese, concentrations in at least two - The Strand and The Swan – are not thought to be associated with contamination from human activities. This is because levels of other contaminant indicators such as the potassium:sodium ratio, E.coli, and nitrate were low in these supplies. Further, they occur in Upper Carboniferous Sandstones and Mudstones, where elevated levels of naturally-derived iron and manganese would not be uncommon (refer to Section 3.3). As such, the levels are more likely to have originated from the sandstone/shale rock through which the groundwater flows, or even from corrosion of steel casing materials.

4.3. Appraisal of Nitrate Data

Nitrate, ammonia, potassium, the potassium:sodium ratio, manganese and chloride are the key indicators of domestic or agricultural contamination in Ireland.

Of these, nitrate, E.coli and iron have exceeded the drinking water MAC in several of the supply sources studied in this report.

Of these three, nitrate has recently been the main focus of attention when assessing domestic and agricultural contamination of groundwater, primarily because:

- it is difficult to treat – many bacteria, by comparison, can be treated relatively easily, and is therefore often of less concern to Sanitary Engineers,
- it is the focus of recent European Legislation (the ‘Nitrates Directive’), and
- it occurs in excess of the MAC in several groundwater supply sources in Ireland.

As such, the Group 1 and Group 2 sources where nitrate was found to be in excess of the GSI threshold are worthy of further discussion.

In considering nitrate data, the GSI subdivides groundwater supply sources into four broad categories:

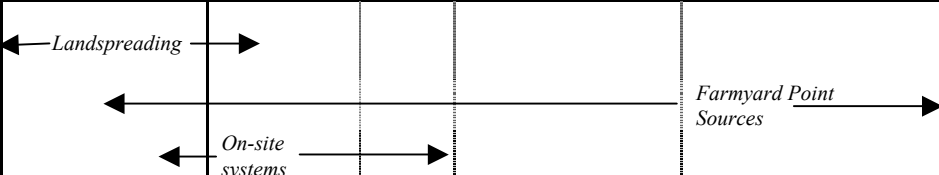
- **Category A:** Nitrate levels regularly exceed 50 mg/l
- **Category B:** Average nitrate levels exceed 25 mg/l and peaks regularly approach or exceed 50 mg/l.
- **Category C:** Average nitrate levels exceed 25 mg/l, peaks rarely approach 50 mg/l but give cause for concern

- **Category D:** Average nitrate levels <25 mg/l and peaks do not give cause for concern.

However, if the main nitrate hazards are to be understood, the nitrate data cannot be considered in isolation, and must be reviewed alongside all the key indicators of domestic and agricultural contamination described in Section 4.2 and Table 3.

Table 4 addresses this issue by merging the Groupings in Table 3 (based on all the contaminant indicators) with nitrate categories A to D.

Table 4: Possible Origin of Nitrate Contamination in Group 1 and Group 2 Water Supply Sources

Group	Nitrates Regularly Exceed GSI Threshold of 25 mg/l					Nitrates Generally less than 25 mg/l
	Supplies Where Only Nitrates Regularly exceed threshold	Supplies Where Compounds in Addition to Nitrate Also Regularly Exceed Threshold.				
		E.coli	NH _x	Potassium:Sodium Ratio	BOTH E.coli and Potassium:Sodium	
1.A	Barrow House.	Killeaney.				
1.B	Aughfeerish, Fermoyle (Ballinakill).	Tinraheen, Emo.		Attanagh.	Cullahill, Cloghogue (Ballinakill), Shanahoe.	
1.C	Darkin, 5 Wells.	Coolfin (Ballacolla), Killenard.		Shanbeg.	Arless, Errill B, Dairyhill (Ballacolla).	
1.D		Kyle.				Cavanagh's (Borris-in-Ossory), Lough (Ballybrittas), Mountsalem, The Heath, Derrin (Borris-in-Ossory), The Orchard (Timahoe), Ballinabranagh, Donaghmore, Knocks Spring (Mountrath), Rosenallis.
2.B	Durrow Convent, Fermoyle (Durrow).					
2.C	Ballydavis 1&2, Max Well, Ralish, Tullore (Ballyroan).					
2.D						Roundwood, Knock Bore (Mountrath), Coolenaugh.
Guide to Possible Origin of Nitrates						Contamination probably originates from point release of organic wastes. Landspreading <u>unlikely</u> to be a significant source of the contamination levels identified.

Note: Origin of nitrate levels at individual sources cannot be firmly established without a field-based hazard assessment.

In terms of general contamination levels, the groupings outlined in Table 3 are retained. Thus, supplies in Groups 1A to 1D will be of more concern than Groups 2B to 2D, which will, in turn, be of more concern than Groups 3 or 4. However, when examining specifically nitrate problems, Group 2B supplies will be of more concern than Group 1D supplies, for example.

The table is also structured to provide some guidance on the origin of problem nitrate concentrations. Contaminant levels in Cullahill, Cloghogue (Ballinakill), and Shanahoe, for example, are likely to have been influenced significantly by point source release from farmyards or landfill. Contaminant levels in Coolfin (Ballacolla), and Killenard, on the other hand, cannot be associated with any one particular origin on the basis of chemical data alone.

Accordingly, Table 4 contains some valuable summary information on supplies with nitrate problems and on the potential origin of the contaminant levels found in those supplies. A few key points arising from this information are summarised below:

- i. Of the twenty-nine Group 1 sources and ten Group 2 supply sources identified in Section 4.2, two (Group 1A) require urgent action in relation to nitrate contamination. This should involve:
 - A delineation of the water catchment and Source Protection Zones for each supply.
 - A field-based hazard assessment within the catchment of each supply to assess the most likely source of contamination.
 - Acquisition of additional water quality data on key indicators of groundwater contamination.

The third point is important as only two nitrate results were available for both the supply sources in question. If point release appears to be an important contribution to the nitrate contamination, measures should be employed to remove or improve these hazards. If landspreading appears to be an important contribution, and if additional data supports the existing categorisation of the supply sources, consideration should be given to the delineation of nitrate vulnerable zones around each supply source.

- ii. Of the twenty-nine Group 1 supply sources and ten Group 2 supply sources identified in Section 4.2, ten (Groups 1B and 2B) require a fairly urgent study in relation to nitrate contamination. Essentially, this means that the same measures as those proposed for Group 1A sources are recommended, though at a lower priority and with less frequent monitoring. As with Group 1A supplies, if point sources appear to be an important contribution to the nitrate contamination, measures should be employed to remove or improve these hazards. If landspreading appears to provide an important contribution, and if additional data indicate that nitrate concentrations remain close to, or occasionally exceed, the MAC, consideration should be given to the delineation of nitrate vulnerable zones around each supply source.
- iii. Of the twelve Group 1B and Group 2B supply sources identified above, four (33%) have elevated potassium:sodium ratios (Attanagh, Cullahill, Shanahoe, and Cloghogue). As such, farmyard point sources are likely to be at least an important contribution to levels of nitrate contamination. Thus, restrictions on landspreading practices alone at these four supply sources are unlikely to fully alleviate the nitrate problem. Further, there is a clear decreasing trend in Attanagh, such that the most recent sample results are below the MAC, and it may be that corrective action has already occurred in the vicinity of this supply.
- iv. Of the remaining Group 1 and Group 2 supply sources identified in Section 4.2, thirteen (Groups 1C and 2C) require a regular review of the nitrates and associated data, and one (Group 1D) requires no action with regard to nitrate other than the continuation of the current monitoring programme.

5. Overall Assessment and Conclusions

- The hydrochemistry of groundwater in Co. Laois is primarily influenced by the dominant limestone lithologies in both the bedrock and the subsoils. The groundwater throughout most of County Laois is hard and can be classed as a calcium-bicarbonate water type. Softer waters are found in the Upper Carboniferous and Devonian Sandstones and Mudstone rock types.
- Of the fifty supply sources studied, the most contaminated supplies are considered to be:
 - Arless,
 - Cloghogue,
 - Cullahill,
 - Emo,

- Darkin Well,
- Five Wells, and
- Shanahoe.

These sources contribute the highest priority overall in terms of corrective action, with all having at least two contaminant indicators in excess of the MAC and at least two contaminant indicators in excess of the GSI threshold (refer to Table 3).

- Twenty-nine supply sources lie within the Group 1 categorisation, meaning that they are ‘polluted’ and that at least one indicator compound is, or has been, in excess of the drinking water MAC. A further ten supplies showed evidence of contamination (but not pollution). These supplies have the potential to become polluted if corrective or preventative action is not taken.
- Groups 1A, 1B, and 2B constitute the highest priority supplies in terms of nitrate problems. There are twelve sources in these groupings:
 - Barrow House.
 - Killeaney.
 - Aughfeerish.
 - Fermoy (Ballinakill).
 - Tinraheen.
 - Emo.
 - Attanagh.
 - Cullahill.
 - Shanahoe.
 - Cloghogue, Ballinakill.
 - Durrow Convent.
 - Fermoy, Durrow.

It is recommended that action is required at these supply sources to increase the frequency of monitoring data available and to identify the origin of the contamination. The latter requires a delineation of the water catchment for each supply and an on-site hazard survey within each catchment. This study, and subsequent decisions on alleviation measures, would be greatly enhanced by the delineation of source protection zones within each supply catchment. Source Protection Zones have already been delineated by the GSI around Durrow Convent and Fermoy (Ballinakill).

Restrictions on landspreading (such as those identified in the European ‘Nitrates Directive’) are unlikely to adequately address the nitrate contamination issues in those supply sources where farmyard waste and other point sources are an important contribution to the levels of contamination identified. The water quality data from at least four of the twelve supply sources of concern (33%) provide evidence that this is the case. However, on-site hazards surveys are required to augment these interpretations.

- Levels of E.coli were ‘regularly’ present (i.e. above the European Union MAC) in thirteen supply sources (26% of the total). This suggests that farmyard point sources or a number of septic tank systems lie relatively close to these sources (i.e. usually within a few hundred metres) and that faecal bacteria, viruses, or even cryptosporidium may also occur within the supply water. Of these thirteen supplies, eight were group schemes (42% of the total number of group schemes) and five were public supplies (16% of total number of public supplies).
- Levels of iron and/or manganese were identified above the European Union MAC in ten supply sources (20% of the total). Levels in at least two of these supplies (The Strand and The Swan) are likely to have a ‘natural’ origin.

6. Recommendations

- The GSI recommends that a database is developed to assimilate available data on all group scheme and public groundwater supplies in the county. Such a database could comprise information on the following:
 - Supply location.
 - All available groundwater quality data (including historical data) for the supply.
 - Construction details (e.g. borehole depth, depth of casing, etc).
 - Pumping and treatment details, along with details of spring overflows, etc.
 - Population served.
 - Reference links to reports on testing, pollution incidents, etc.

The GSI can advise on the data requirements of such a database, particularly in relation to those supplies where source protection reports have been completed. Much of the relevant data would already have been compiled as part of the preparation of these reports.

- Group 1A, 1B, and 2B supplies require action to identify and remove or improve the source of nitrate contamination. The likely origins of the nitrate contamination at these supply sources cannot be adequately assessed without consideration of other indicator compounds and an on-site survey of potential contamination hazards. Clearly, the nitrate problem at a source cannot be alleviated without adequate consideration of the origin of the problem. Further, the hazards cannot be adequately or efficiently examined without prior consideration of the water catchment for each supply. This can best be achieved by the commissioning of source protection zones studies from the GSI or suitably-qualified consultants.

- All supply sources require analysis of raw water as well as treated water samples on a regular basis. Full analyses (including all major ions) should be carried out on these samples. The frequency of sampling at each supply source should be influenced by the degree of concern at each source. The following is recommended:

Group	Number Supply Sources in Each Group	Recommended Sampling Frequency
Group 1A	2	At least <i>fortnightly</i> , until conclusions can be drawn on the origin of the contamination and appropriate alleviation measures are taken. Then down-grade to Group 3 sampling frequency.
Group 1B	8	At least <i>monthly</i> , until conclusions can be drawn on the origin of the contamination and appropriate alleviation measures are taken. Then down-grade to Group 3 sampling frequency.
Group 2B	2	At least <i>monthly</i> , until conclusions can be drawn on the origin of the contamination and appropriate alleviation measures are taken. Then down-grade to Group 3 sampling frequency.
Groups 1C, 1D, 2C, 2D.	28	At least <i>quarterly</i> , until conclusions can be drawn on the origin of the contamination and appropriate alleviation measures are taken. Then down-grade to Group 3 sampling frequency.
Groups 3 and 4	10	At least twice yearly.

- Indicators of organic compound contamination, including those of petroleum, pesticide, sheep dip and herbicide substances, should be included twice yearly. One example is to undertake a ‘semi-volatile organic carbon’ scan on selected samples. These analyses are relatively cheap and suitably-accredited laboratories should be able to identify indicator compounds of all the above substances from such scans (e.g. certain phenols and permethrin, when found together, can indicate sheep dip contamination). Analyses such as these cannot give the precise concentrations required for drinking water analyses. However, they can identify the indicator compounds, where they occur, to a level comparable with the detection limits specified in drinking water criteria. Once detected in a supply source sample, more specific compounds can be examined. For example, if diesel fuel-related compounds have been detected in a scan, analysis of total petroleum hydrocarbons can be requested for additional samples.
- A programme of undertaking groundwater protection zone delineation around public and group scheme supplies, using the GSI guidelines, over the next few years is recommended. After the main supply sources of nitrates concern have been addressed in this manner, Groups 1, 2 and 3 sources should be used in prioritising sources for this work.
- A programme of checking the sanitary protection at each well and spring site (i.e. on Co. Co. property in the immediate vicinity of the source) would help to ensure that shallow groundwater and surface water is not entering the source and that accidental spillages would not contaminate the source.
- All group scheme water supplies should be disinfected adequately.

7. Acknowledgements

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APPENDIX A

Appendix A: Discussion Of the Key Indicators of Domestic and Agricultural Contamination of Groundwater

A.1 Introduction

This appendix is adapted from Daly, 1996.

There has been a tendency in analysing groundwater samples to test for a limited number of constituents. A "full" or "complete" analysis, which includes all the major anions and cations, is generally recommended for routine monitoring and for assessing pollution incidents. This enables (i) a check on the reliability of the analysis (by doing an ionic balance), (ii) a proper assessment of the water chemistry and quality and (iii) a possible indication of the source of contamination. A listing of recommended and optional parameters are given in Table A1. It is also important that the water samples taken for analysis have not been chlorinated - this is a difficulty in some local authority areas where water take-off points prior to chlorination have not been installed.

The following parameters are good contamination indicators: E.coli, nitrate, ammonia, potassium, chloride, iron, manganese and trace organics.

TABLE A1

Recommended Parameters		
Appearance	Calcium (Ca)	Nitrate (NO ₃)*
Sediment	Magnesium (Mg)	Ammonia (NH ₄ and NH ₃)*
pH (lab)	Sodium (Na)	Iron (Fe)*
Electrical Conductivity (EC)*	Potassium (K)*	Manganese (Mn)*
Total Hardness	Chloride (Cl)*	
General coliform	Sulphate (SO ₄)*	
E. coli *	Alkalinity	
Optional Parameters (depending on local circumstances or reasons for sampling)		
Fluoride (F)	Fatty acids *	Zinc (Zn)
Orthophosphate	Trace organics *	Copper (Cu)
Nitrite (NO ₂)*	TOC *	Lead (Pb)
B.O.D.*	Boron (B) *	Other metals
Dissolved Oxygen *	Cadmium (Cd)	
* good indicators of contamination		

A.2 Faecal Bacteria and Viruses

E. coli is the parameter tested as an indicator of the presence of faecal bacteria and perhaps viruses; constituents which pose a significant risk to human health. The most common health problem arising from the presence of faecal bacteria in groundwater is diarrhoea, but typhoid fever, infectious hepatitis and gastrointestinal infections can also occur. Although *E. coli* bacteria are an excellent indicator of pollution, they can come from different sources - septic tank effluent, farmyard waste, landfill sites,

birds. The faecal coliform : faecal streptococci ratio has been suggested as a tentative indicator to distinguish between animal and human waste sources (Henry *et al.*, 1987). However, researchers in Virginia Tech (Reneau, 1996) cautioned against the use of this technique.

Viruses are a particular cause for concern as they survive longer in groundwater than indicator bacteria (Gerba and Bitton, 1984).

The published data on elimination of bacteria and viruses in groundwater has been compiled by Pekdeger and Matthess (1983), who show that in different investigations 99.9% elimination of *E. coli* occurred after 10-15 days. The mean of the evaluated investigations was 25 days. They show that 99.9% elimination of various viruses occurred after 16-120 days, with a mean of 35 days for Polio-, Hepatitis, and Enteroviruses. According to Armon and Kott (1994), pathogenic bacteria can survive for more than ten days under adverse conditions and up to 100 days under favourable conditions; enteroviruses can survive from about 25 days up to 170 days in soils.

Bacteria can move considerable distances in the subsurface, given the right conditions. In a sand and gravel aquifer, coliform bacteria were isolated 100 ft from the source 35 hours after the sewage was introduced (Hagedorn, 1983). They can travel several kilometres in karstic aquifers. In Ireland, research at Sligo RTC involved examining in detail the impact of septic tank systems at three locations with different site conditions (Henry, 1990; summarised in Daly, Thorn and Henry, 1993). Piezometers were installed down-gradient; the distances of the furthest piezometers were 8 m, 10 m and 9.5 m, respectively. Unsurprisingly, high faecal bacteria counts were obtained in the piezometers at the two sites with soakage pits, one with limestone bedrock at a shallow depth where the highest count (max. 14 000 cfu's per 100 ml) and the second where sand/gravel over limestone was present (max 3 000 cfu's per 100 ml). At the third site, a percolation area was installed at 1.0 m b.g.l.; the subsoils between the percolation pipes and the fractured bedrock consisted of 1.5 m sandy loam over 3.5 m of poorly sorted gravel; the water table was 3.5 b.g.l. (So this site would satisfy the water table and depth to rock requirements of S.R.6:1991, and most likely the percolation test requirement.) Yet, the maximum faecal coliform bacteria count was 300 cfus per 100 ml. Faecal streptococci were present in all three piezometers. It is highly likely that wells located 30 m down gradient of the drainage fields would be polluted by faecal bacteria.

As viruses are smaller than bacteria, they are not readily filtered out as effluent moves through the ground. The main means of attenuation is by adsorption on clay particles. Viruses can travel considerable distances underground, depths as great as 67 m and horizontal migrations as far as 400 m have been reported (Keswick and Gerba, 1980; as reported in US EPA, 1987). The possible presence of viruses in groundwater as a result of pollution by septic tank systems is a matter of concern because of their mobility and the fact that indicator bacteria such as faecal coliforms have been found not to correlate with the presence of viruses in groundwater samples (US EPA, 1987).

The natural environment, in particular the soils and subsoils, can be effective in removing bacteria and viruses by predation, filtration and absorption. There are two high risk situations: (i) where permeable sands and gravels with a shallow water table are present; and (ii) where fractured rock, particularly limestone, is present close to the ground surface. The presence of clayey gravels, tills, and peat will, in many instances, hinder the vertical migration of microbes, although preferential flow paths, such as cracks in clayey materials, can allow rapid movement and bypassing of the subsoil.

A.3 Nitrate

Nitrate is one of the most common contaminants identified in groundwater and increasing concentrations have been recorded in many developed countries. The consumption of nitrate rich water by young children may give rise to a condition known as methaemoglobinaemia (blue baby syndrome). The formation of carcinogenic nitrosamines is also a possible health hazard and epidemiological studies have indicated a positive correlation between nitrate consumption in drinking

water and the incidence of gastric cancer. However, the correlation is not proven according to some experts (Wild and Cameron, 1980). The EC MAC for drinking water is 50mg/l.

The nitrate ion is not adsorbed on clay or organic matter. It is highly mobile and under wet conditions is easily leached out of the rooting zone and through soil and permeable subsoil. As the normal concentrations in uncontaminated groundwater is low (less than 5 mg/l), nitrate can be a good indicator of contamination by fertilisers and waste organic matter.

In the past there has been a tendency in Ireland to assume that the presence of high nitrates in well water indicated an impact by inorganic fertilisers. This assumption has frequently been wrong, as examination of other constituents in the water showed that organic wastes - usually farmyard waste, probably soiled water - were the source. The nitrate concentrations in wells with a low abstraction rate - domestic and farm wells - can readily be influenced by soiled water seeping underground in the vicinity of the farmyard or from the spraying of soiled water on adjoining land. Even septic tank effluent can raise the nitrate levels; if a septic tank system is in the zone of contribution of a well, a four-fold dilution of the nitrogen in the effluent is needed to bring the concentration of nitrate below the EU MAC (as the EU limit is 50 mg/l as NO_3 or 11.3 mg/l as N and assuming that the N concentration in septic tank effluent is 45 mg/l).

The recently produced draft county reports by the EPA on nitrate in groundwater show high levels of nitrate in a significant number of public and group scheme supplies, particularly in south and southern counties and in counties with intensive agriculture, such as Carlow and Louth. This suggests that diffuse sources – landspreading of fertilisers – is having an impact on groundwater.

In assessing regional groundwater quality and, in particular the nitrate levels in groundwater, it is important that:

- (i) conclusions should not be drawn using data only from private wells, which are frequently located near potential point pollution sources and from which only a small quantity of groundwater is abstracted;
- (ii) account should be taken of the complete chemistry of the sample and not just nitrate, as well as the presence of *E. coli*;
- (iii) account should be taken of not only the land-use in the area but also the location of point pollution sources;
- (iv) account should be taken of the regional hydrogeology and the relationship of this to the well itself. For instance, shallow wells generally show higher nitrate concentrations than deeper wells, low permeability sediments can cause denitrification, knowledge on the groundwater flow direction is needed to assess the influence of land-use.

Giving a balanced view of the nitrate situation in Irish groundwater is not easy as the data availability is poor. On the one hand, many of the wells with relatively high nitrate levels examined by the GSI are being contaminated by organic waste and not inorganic fertilisers. It is essential that "nitrate vulnerable areas" under the Nitrates Directive are not delineated without the proper evidence, as this would restrict farming in these areas unnecessarily. On the other hand, inorganic fertilisers have increased the background nitrate levels significantly in some of the intensive agricultural areas - the Barrow valley, for instance.

A.4 Ammonia

Ammonia has a low mobility in soil and subsoil and its presence at concentrations greater than 0.1 mg/l in groundwater indicates a nearby waste source and/or vulnerable conditions. The EU MAC is 0.3 mg/l.

A.5 Potassium

Potassium (K) is relatively immobile in soil and subsoil. Consequently the spreading of manure, slurry and inorganic fertilisers is unlikely to significantly increase the potassium concentrations in groundwater. In most areas in Ireland, the background potassium levels in groundwater are less than 3.0 mg/l. Higher concentrations are found occasionally where the rock contains potassium e.g. certain granites and sandstones. The background potassium:sodium ratio in most Irish groundwaters is less than 0.4 and often 0.3. The K:Na ratio of soiled water and other wastes derived from plant organic matter is considerably greater than 0.4, whereas the ratio in septic tank effluent is less than 0.2. Consequently a K:Na ratio greater than 0.4 can be used to indicate contamination by plant organic matter - usually in farmyards, occasionally landfill sites (from the breakdown of paper). However, a K:Na ratio lower than 0.4 does not indicate that farmyard wastes are **not** the source of contamination (or that a septic tank is the cause), as K is less mobile than Na. (Phosphorus is increasingly a significant pollutant and cause of eutrophication in surface water. It is not a problem in groundwater as it usually is not mobile in soil and subsoil).

A.6 Chloride

The principle source of chloride in uncontaminated groundwater is rainfall and so in any region, depending on the distance from the sea and evapotranspiration, chloride levels in groundwater will be fairly constant. Chloride, like nitrate, is a mobile anion. Also, it is a constituent of organic wastes. Consequently, levels appreciably above background levels (12-15 mg/l in Co. Offaly, for instance) have been taken to indicate contamination by organic wastes such as septic tank systems. While this is probably broadly correct, Sherwood (1991) has pointed out that chloride can also be derived from potassium fertilisers.

A.7 Iron and manganese

Although they are present under natural conditions in groundwater in some areas, they can also be good indicators of contamination by organic wastes. Effluent from the wastes cause deoxygenation in the ground which results in dissolution of iron (Fe) and manganese (Mn) from the soil, subsoil and bedrock into groundwater. With reoxygenation in the well or water supply system the Fe and Mn precipitate. High Mn concentrations can be a good indicator of pollution by silage effluent. However, it can also be caused by other high BOD wastes such as milk, landfill leachate and perhaps soiled water and septic tank effluent.

Box A1 Warning/trigger Levels for Certain Contaminants

As human activities have had some impact on a high proportion of the groundwater in Ireland, there are few areas where the groundwater is in a pristine, completely natural condition. Consequently, most groundwater is contaminated to some degree although it is usually not polluted. To-date there has been a tendency to focus only on the EU maximum admissible concentrations (MAC). In the view of the GSI, there is a need for assessment of the degree of contamination of groundwater as well as showing whether the water is polluted or not. This type of assessment can indicate where appreciable impacts are occurring. It can act as a warning that either the situation could worsen and so needs regular monitoring and careful land-use planning, or that there may be periods when the source is polluted and poses a risk to human health and as a consequence needs regular monitoring. Consequently, thresholds for certain parameters can be used to help indicate situations where significant contamination but not pollution is occurring. *So if you have to assess groundwater quality data when considering the location of a potentially polluting activity, see if the thresholds given below are of use.*

Parameter	Threshold mg/l	EU MAC mg/l
Nitrate	25	50
Potassium	4	12
Chloride	30 (except near sea)	250
Ammonia	0.15	0.3
K/Na ratio	0.3-0.4	
Faecal bacteria	0	0

Box A2 Summary : Assessing a Problem Area

Let us assume that you are examining an area with potential groundwater contamination problems and that you have taken samples in nearby wells. How can the analyses be assessed?

E. coli present ⇒ organic waste source nearby (except in karst areas), usually either a septic tank system or farmyard.

E. coli absent ⇒ either not polluted by organic waste or bacteria have not survived due to attenuation or time of travel to well greater than 100 days.

Nitrate > 25 mg/l ⇒ either inorganic fertiliser or organic waste source; check other parameters.

Ammonia > 0.15 mg/l ⇒ source is nearby organic waste; fertiliser is not an issue.

Potassium (K) > 5.0 mg/l ⇒ source is probably organic waste.

K/Na ratio > 0.4 (0.3, in many areas) ⇒ Farmyard waste rather than septic tank effluent is the source. If < 0.3, no conclusion is possible.

Chloride > 30 mg/l ⇒ organic waste source. However this does not apply in the vicinity of the coast (within 20 km at least).

In conclusion, faecal bacteria, nitrate, ammonia, high K/Na ratio and chloride indicate contamination by organic waste. However, only the high K/Na helps distinguish between septic tank effluent and farmyard wastes. So in many instances, while the analyses can show potential problems, other information is needed to complete the assessment.

A.8 References

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Figure1-Arless
Key indicators of agricultural and Domestic Groundwater Contamination

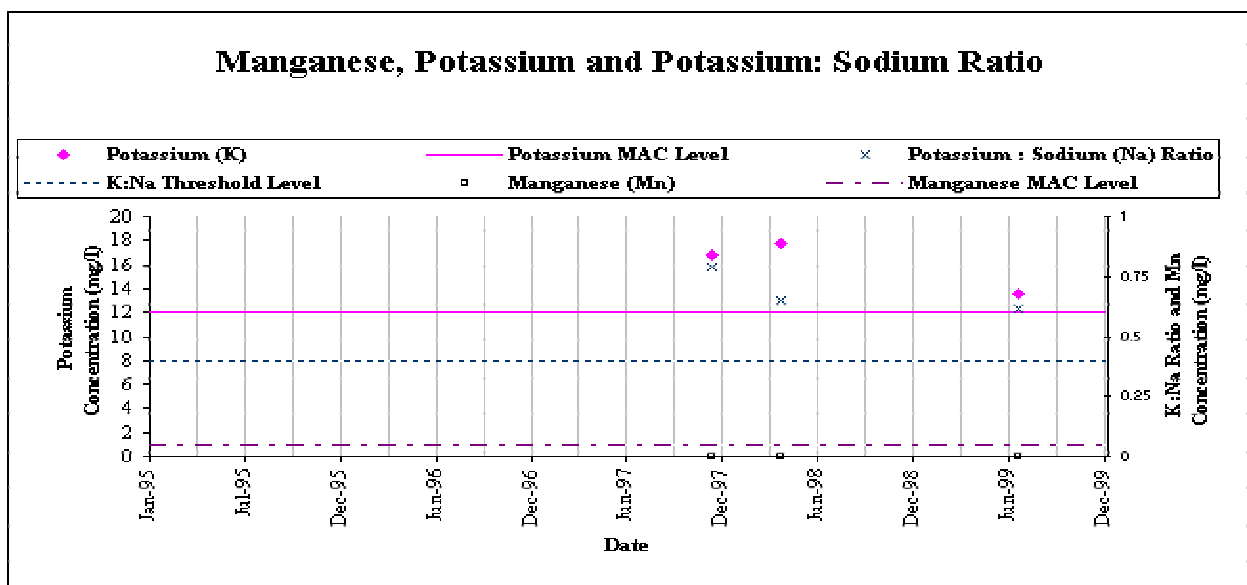
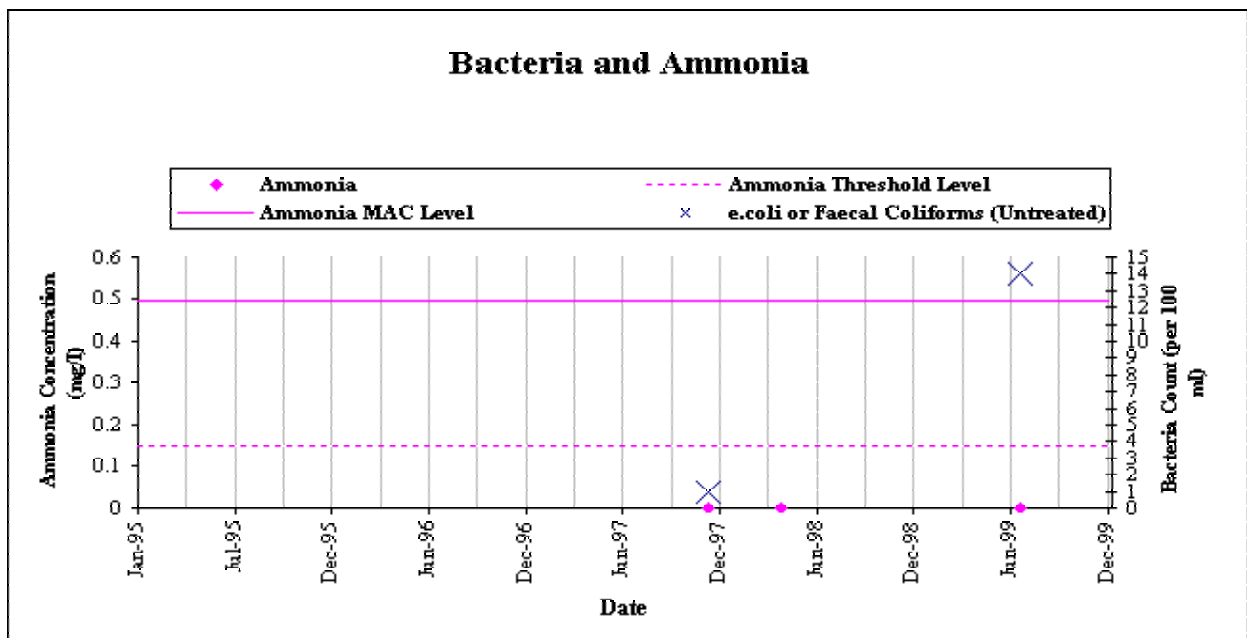
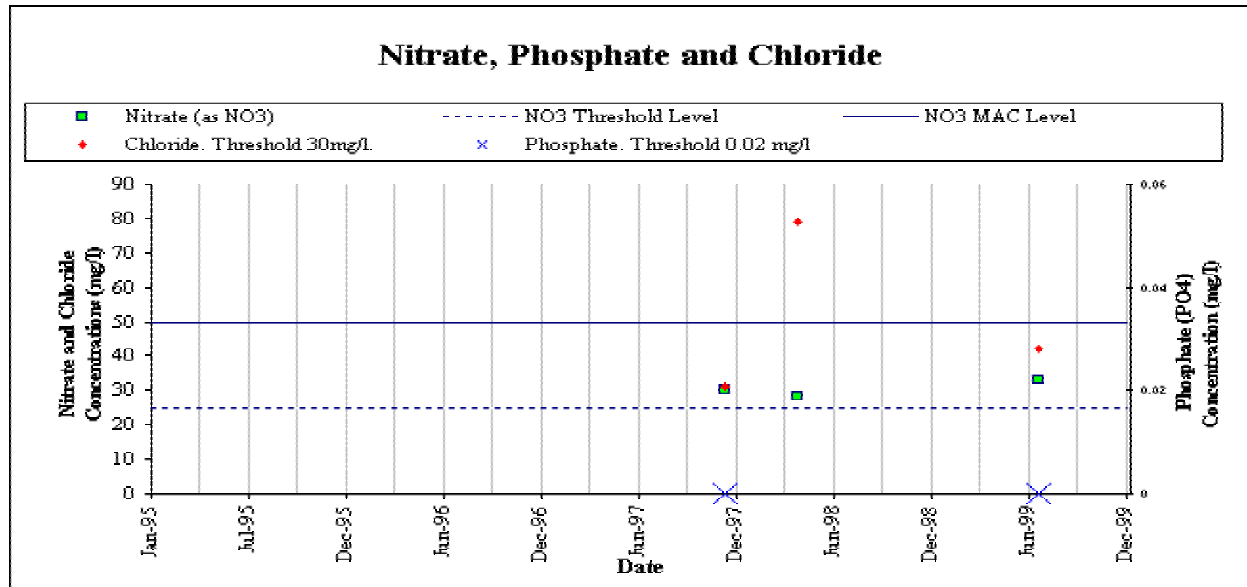


Figure2-Attanagh GWS
Key indicators of agricultural and Domestic Groundwater Contamination

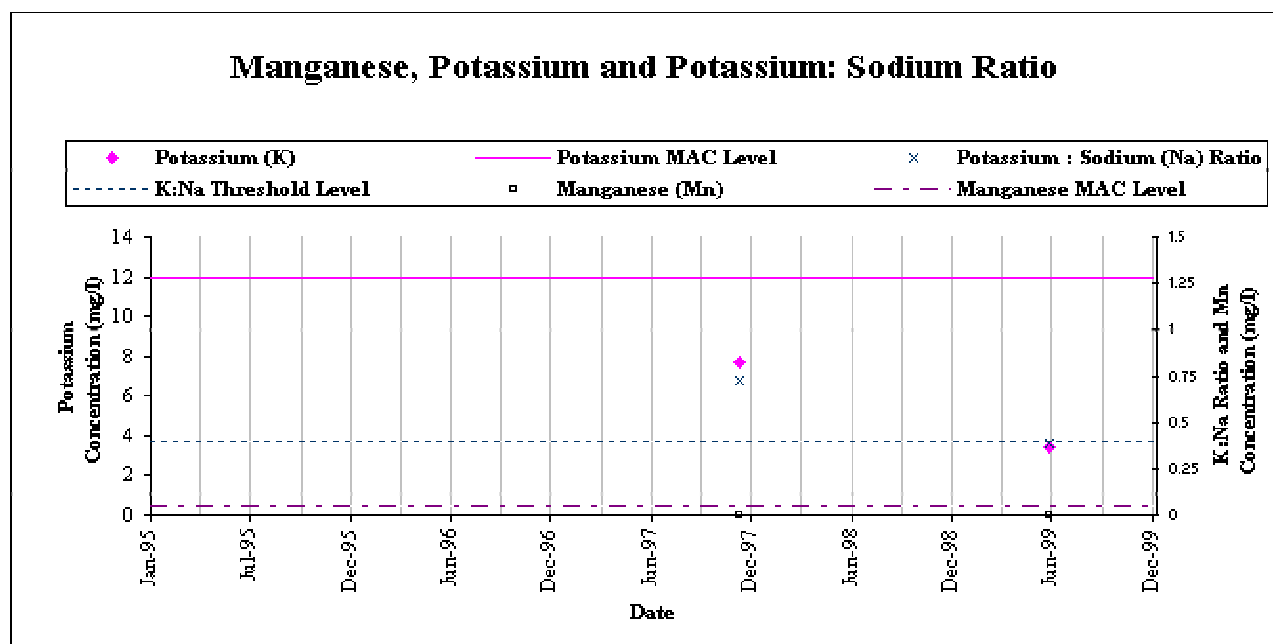
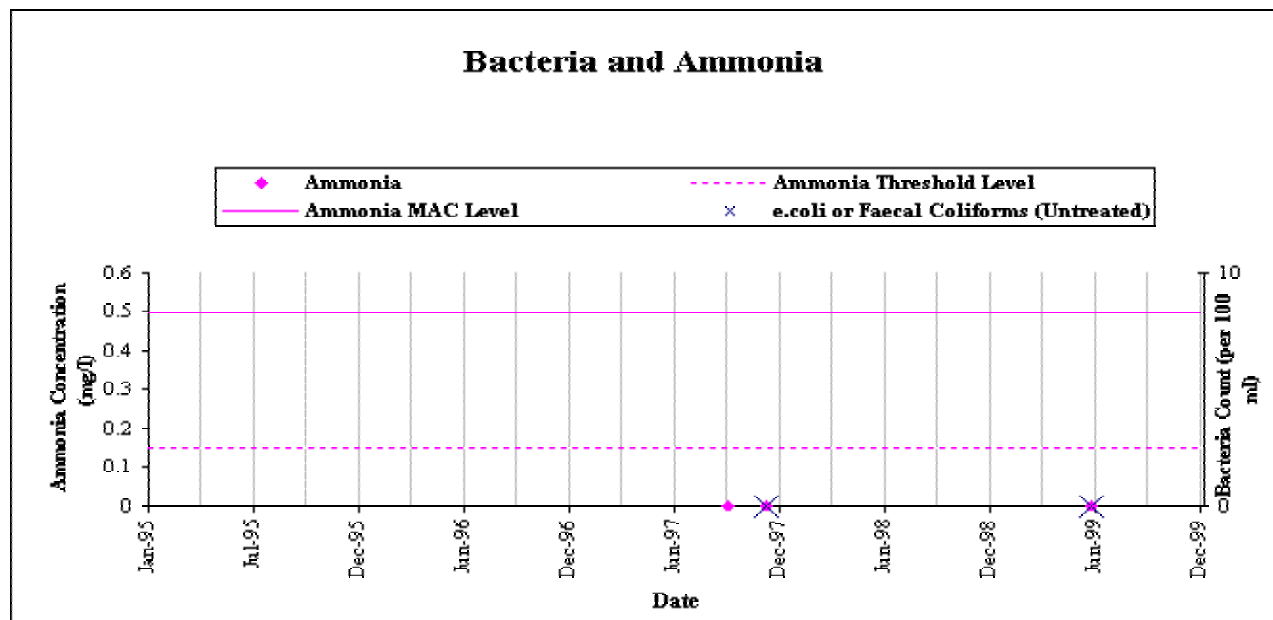
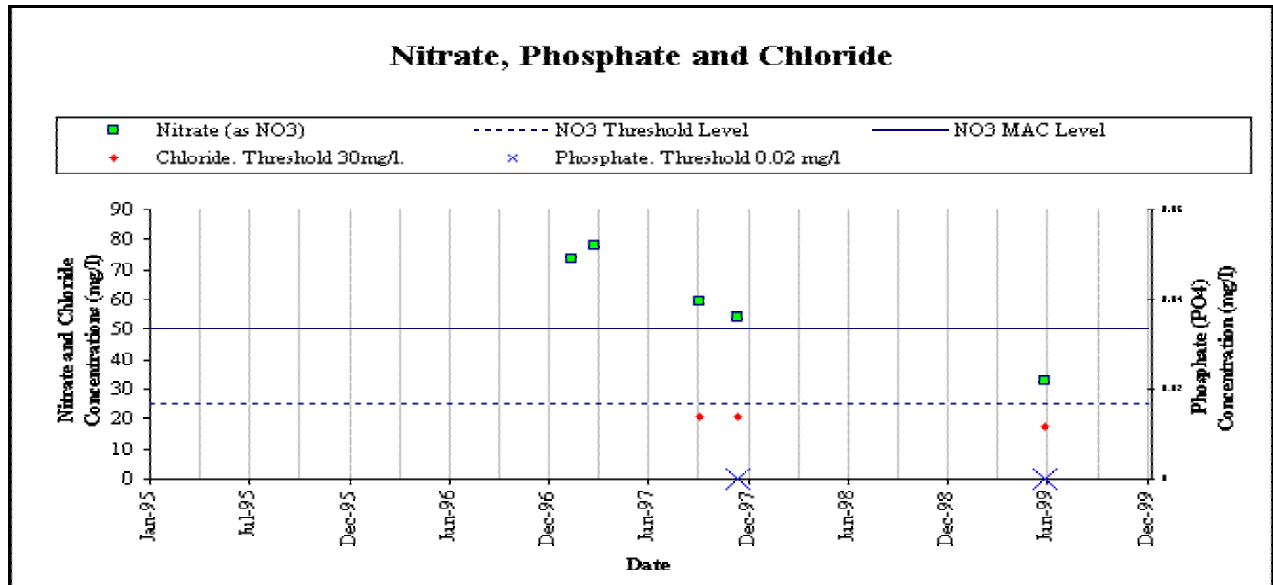


Figure3-Aughfeerish
Key indicators of agricultural and Domestic Groundwater Contamination

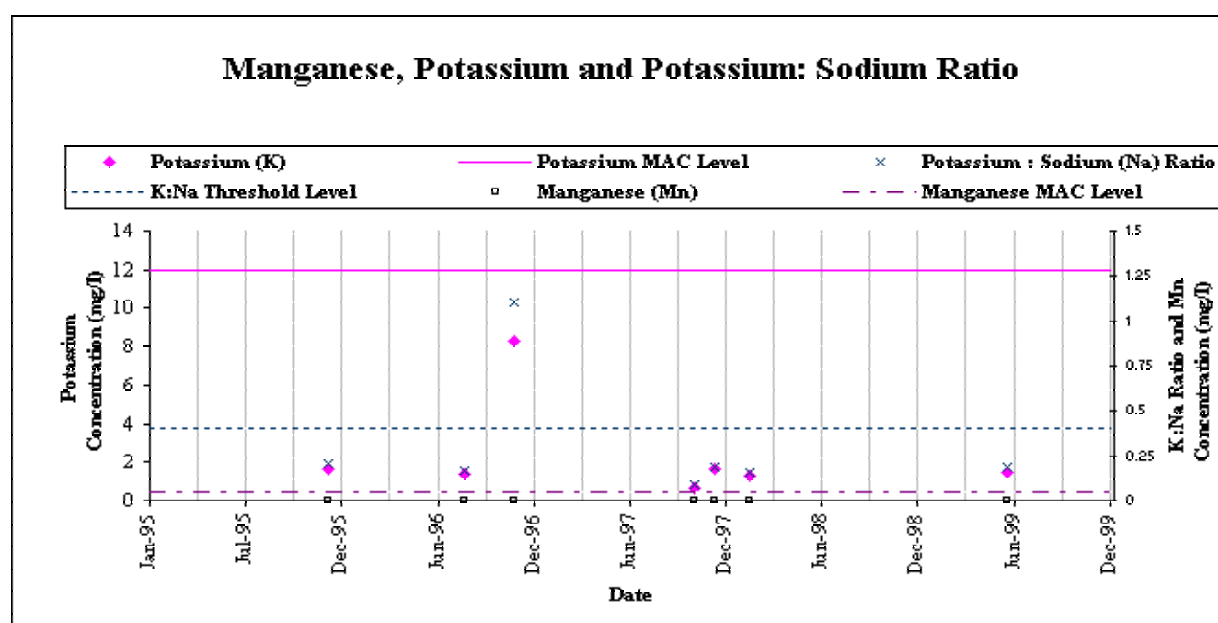
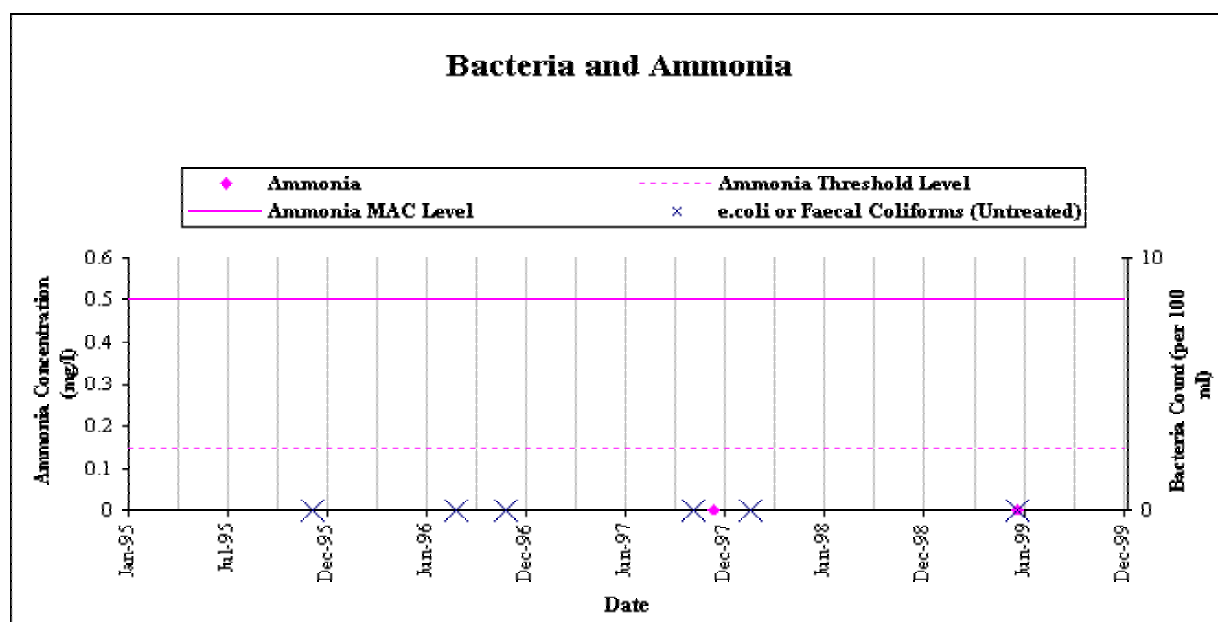
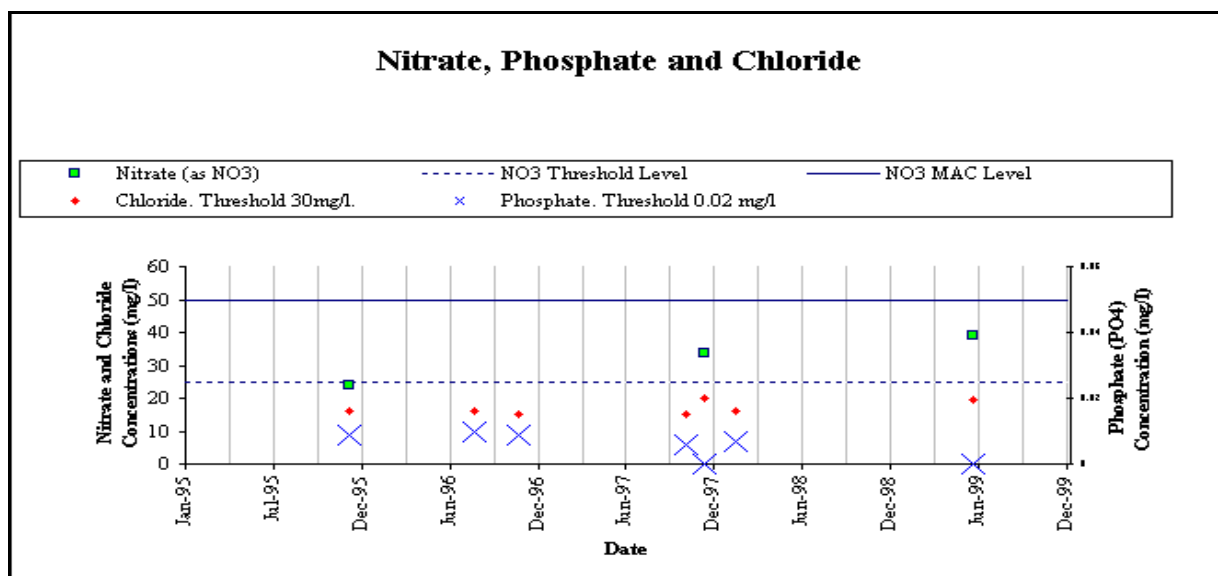


Figure 4-Ballydavis 1
Key indicators of agricultural and Domestic Groundwater Contamination

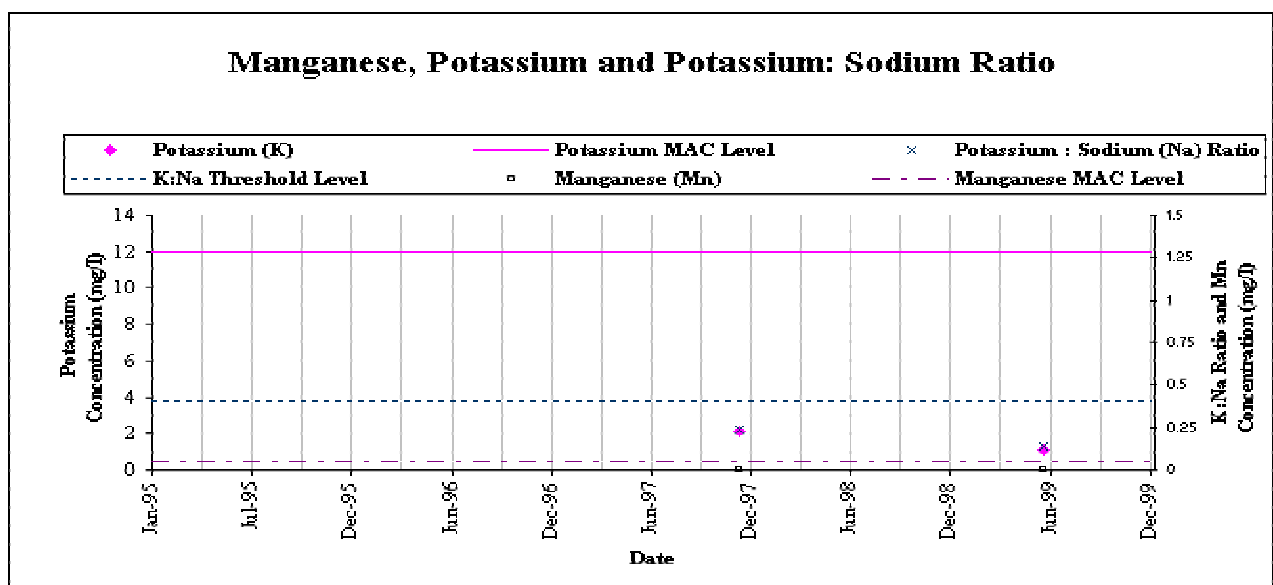
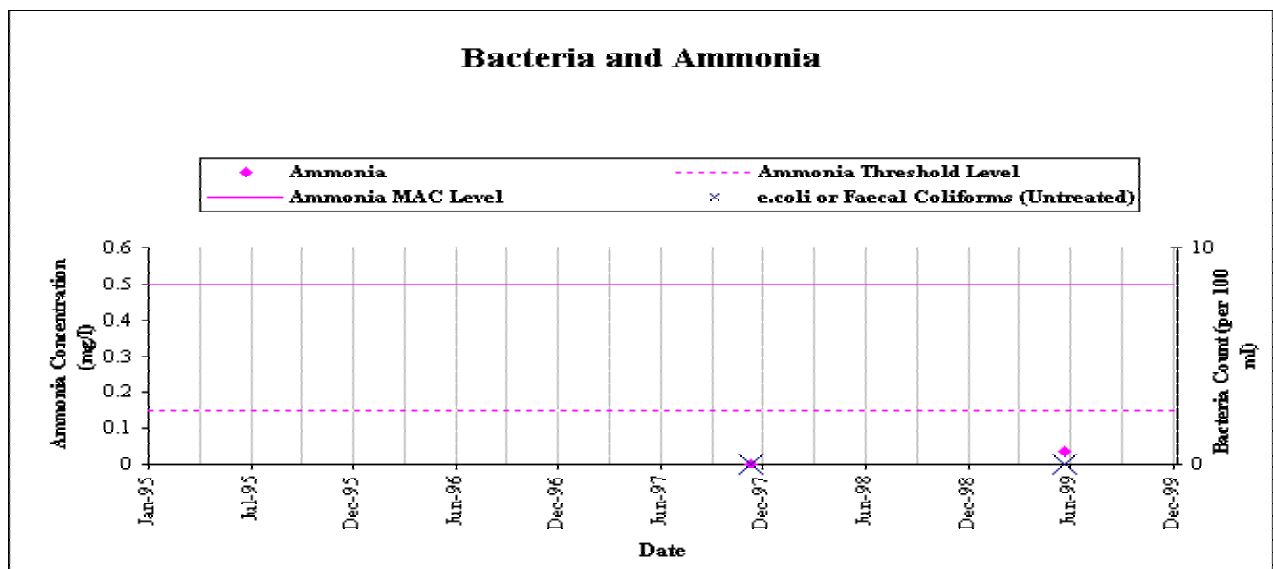
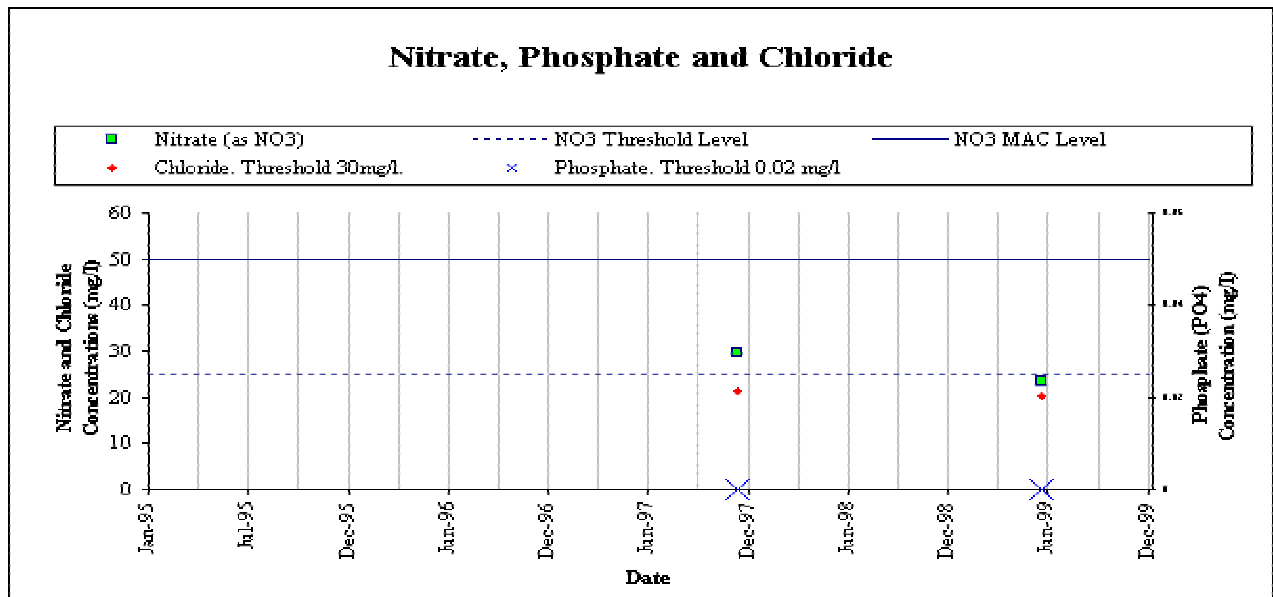


Figure 5-Ballydavis 2
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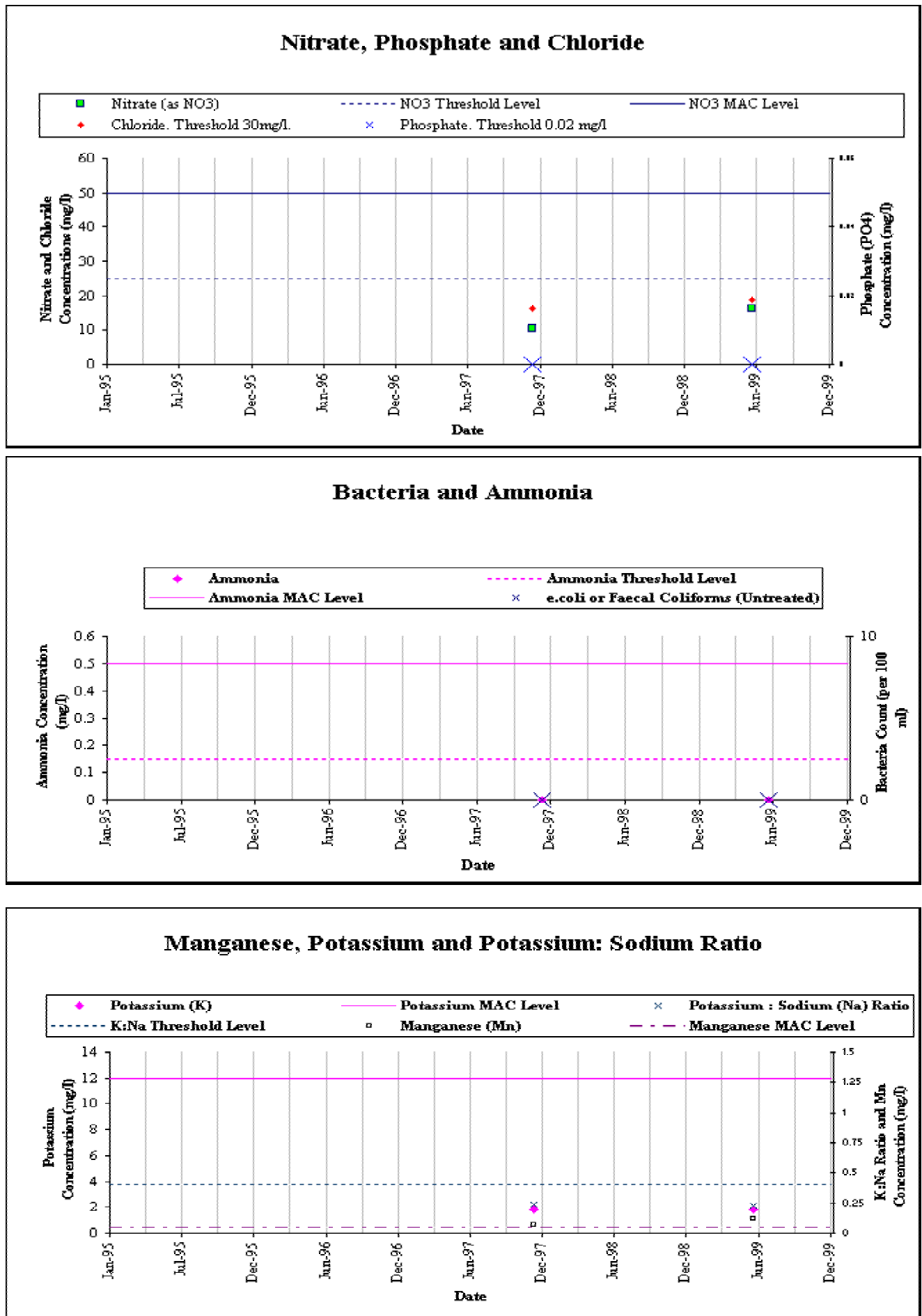


Figure 6-Ballinabranagh
Key indicators of agricultural and Domestic Groundwater Contamination

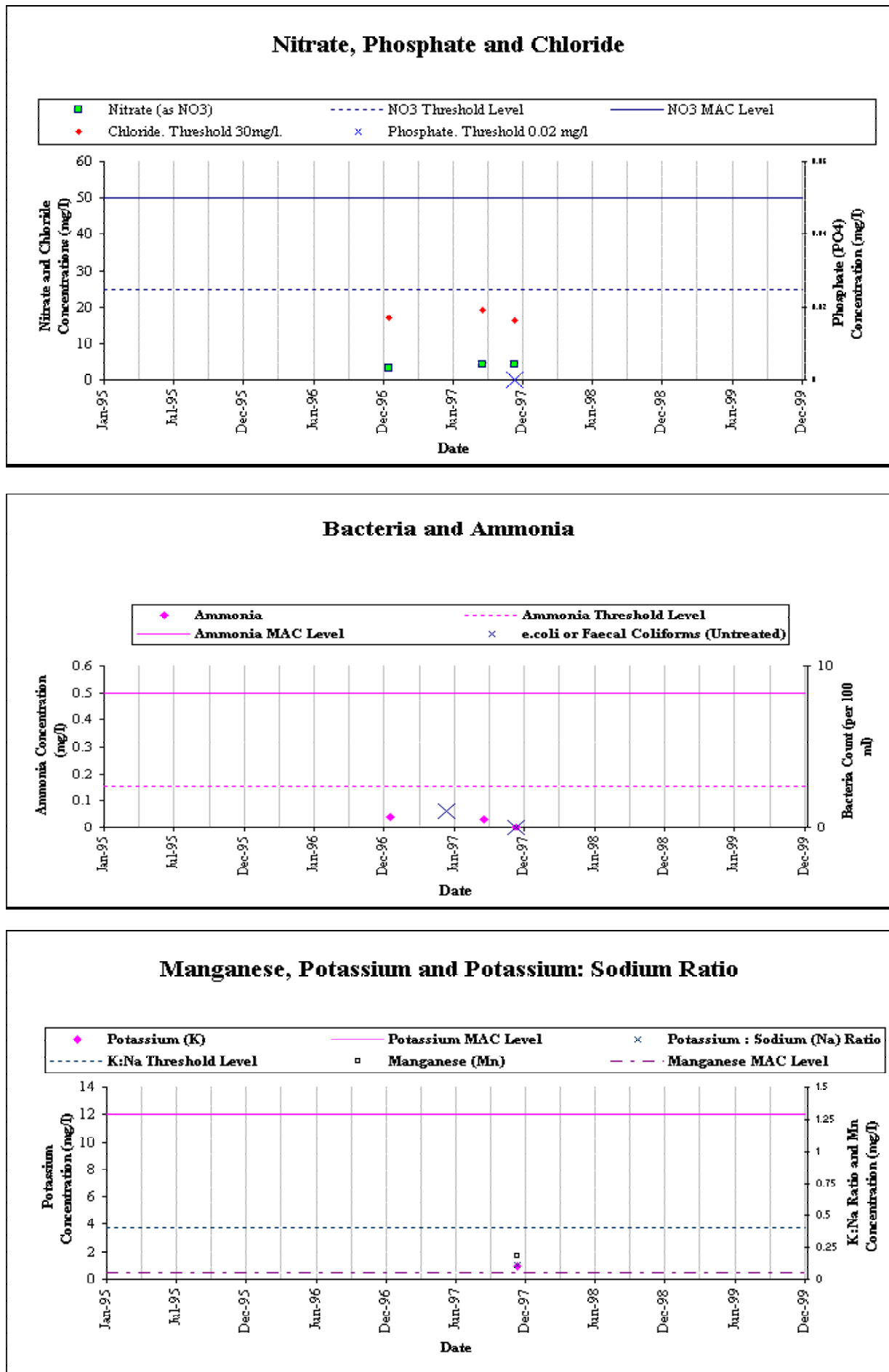


Figure 7-Ballypickas
Key indicators of agricultural and Domestic Groundwater Contamination

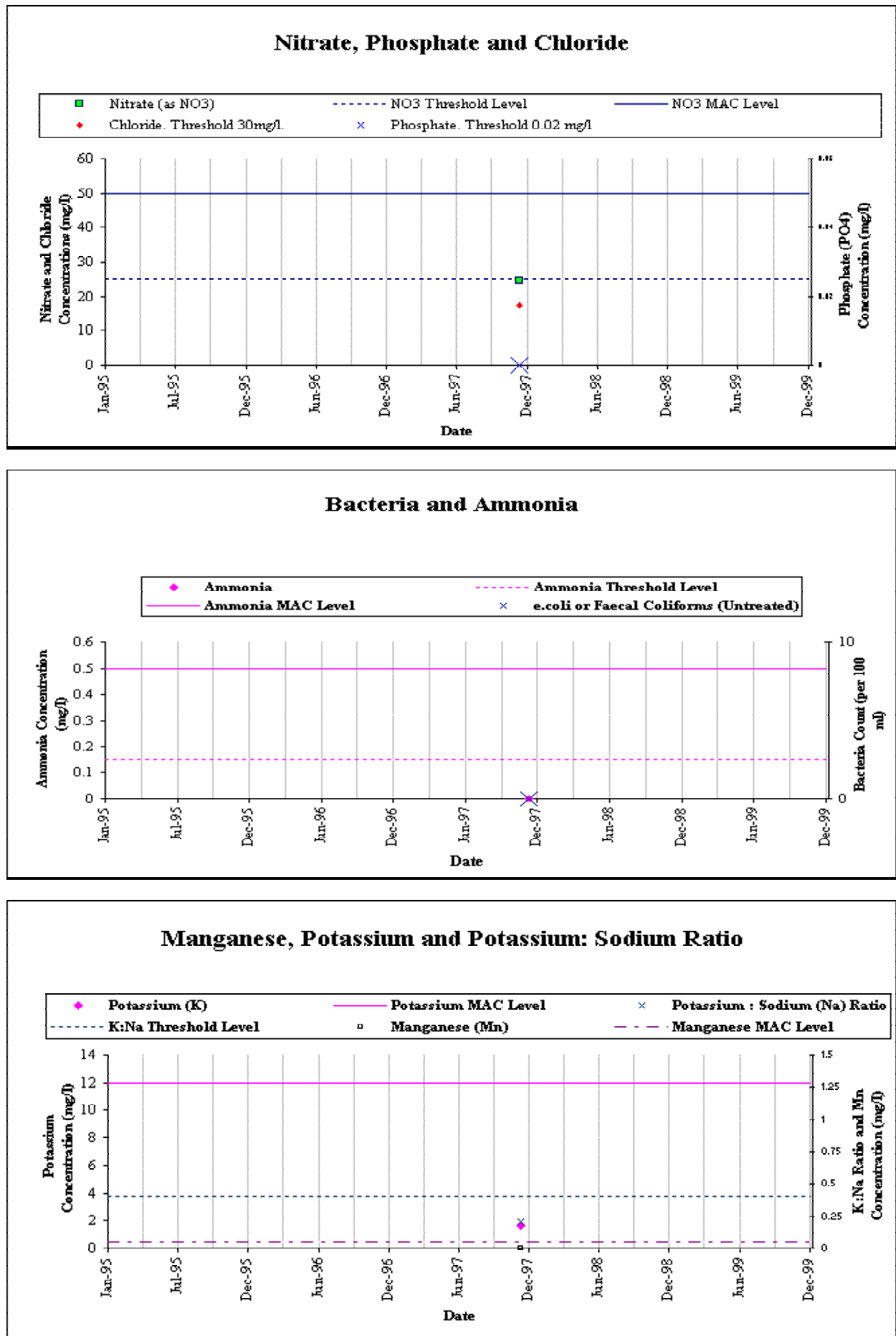


Figure 8-Barrow House
Key indicators of agricultural and Domestic Groundwater Contamination

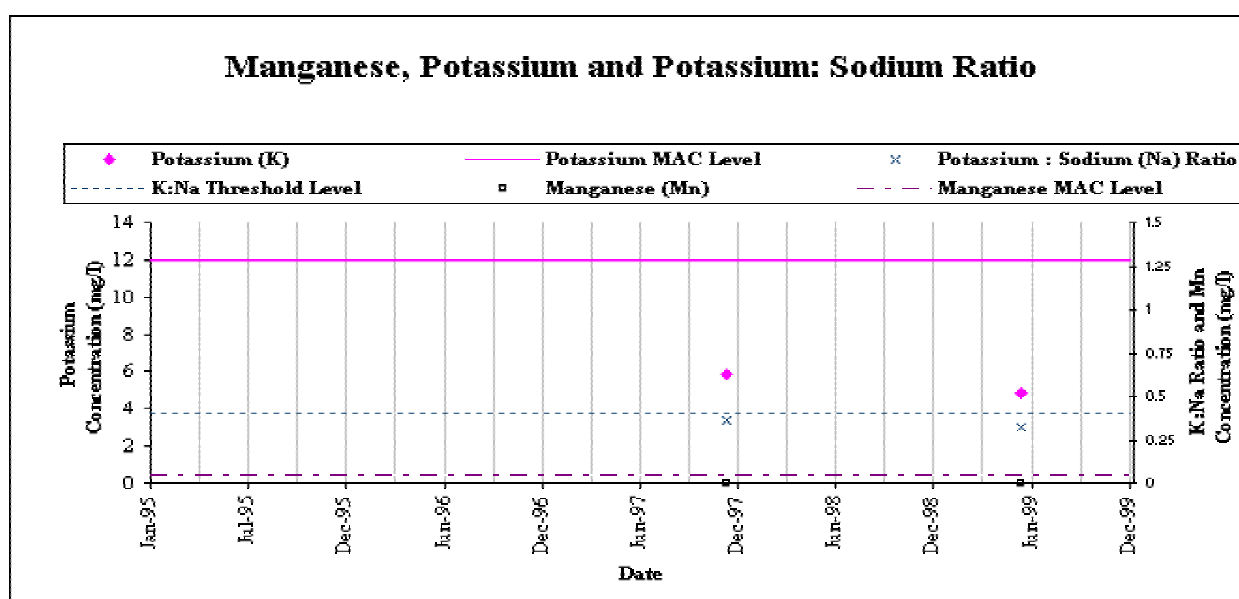
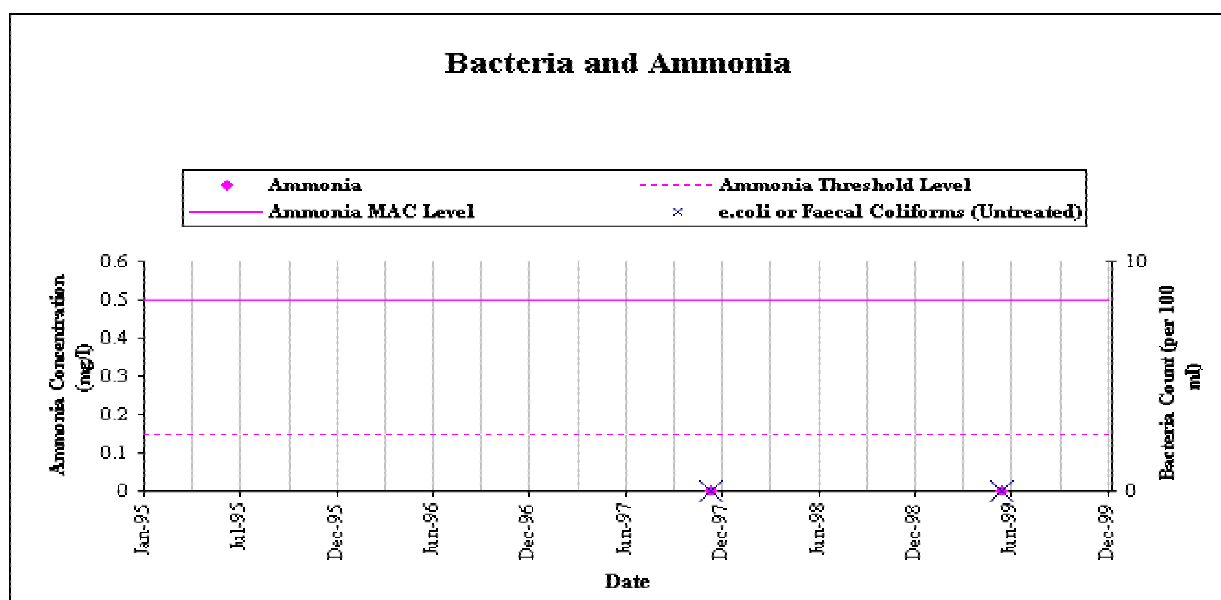
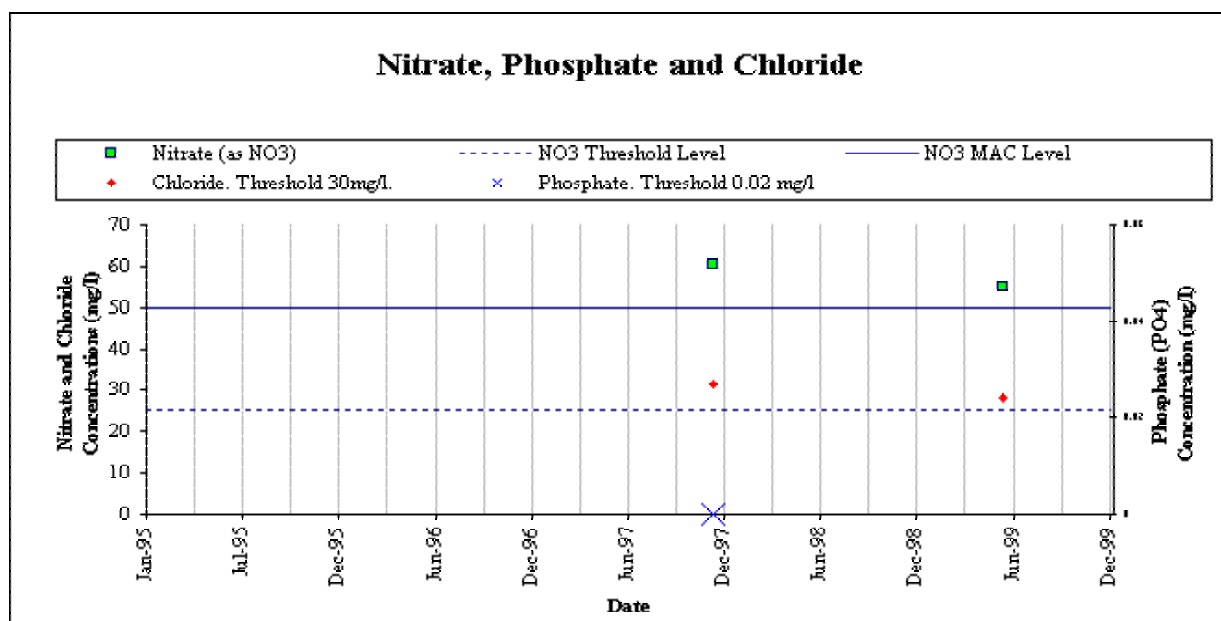


Figure 9-Byrnes, Boris-in- Ossory
Key indicators of agricultural and Domestic Groundwater Contamination

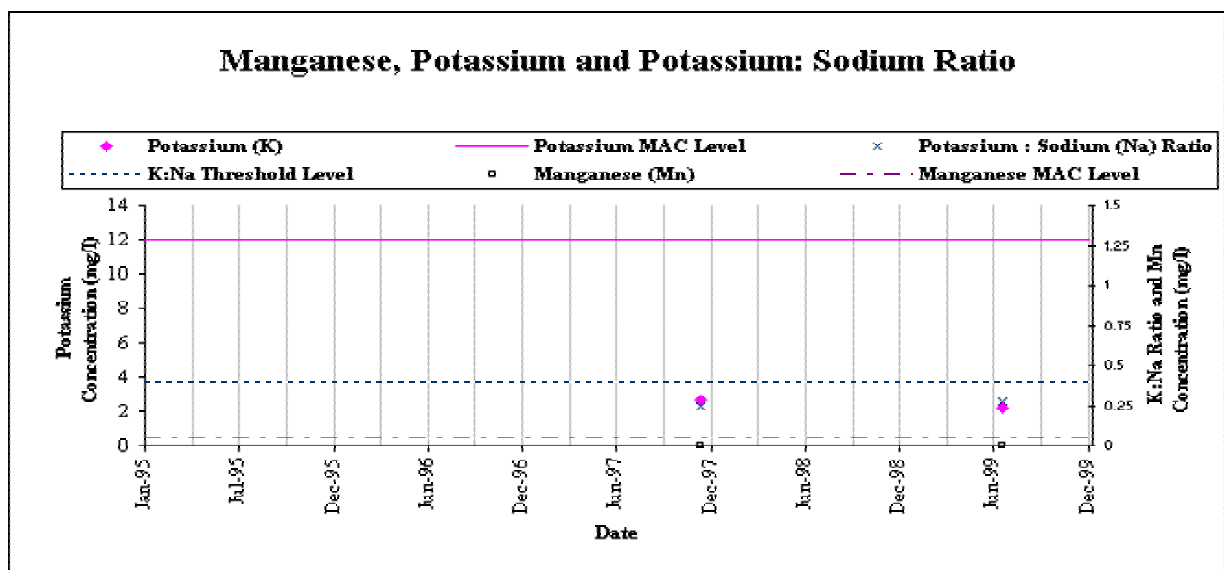
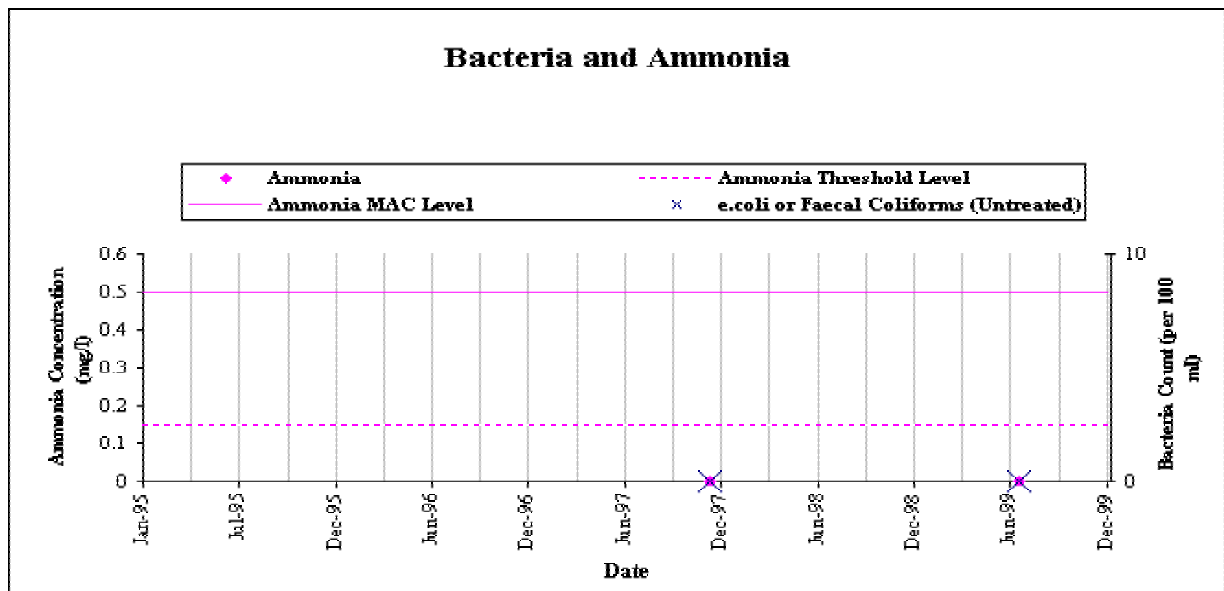
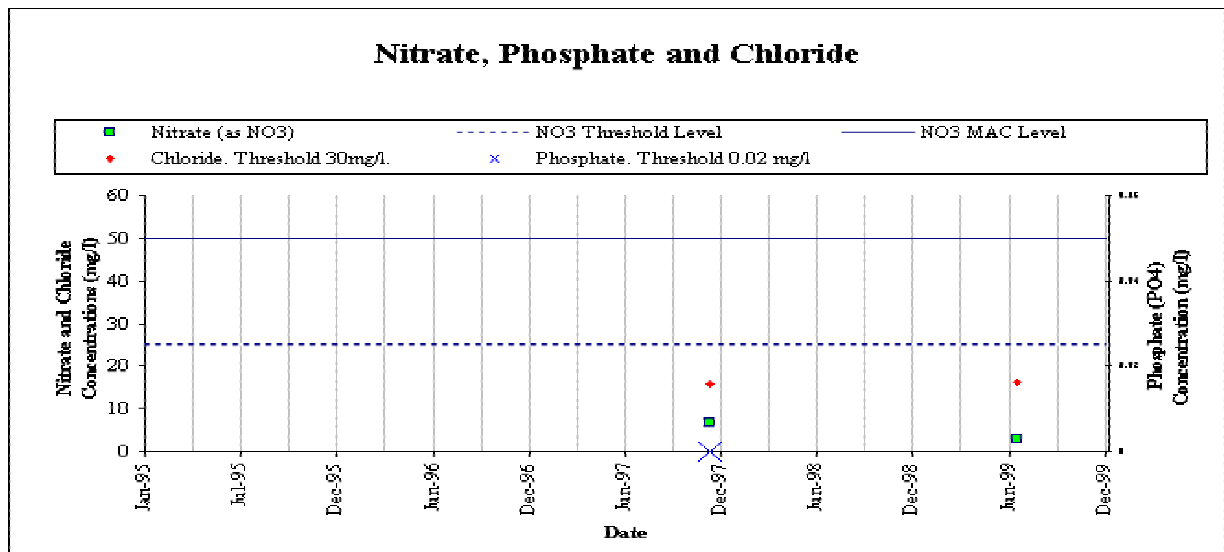


Figure 10-Cavanagh's Borris-in-Ossory
Key indicators of agricultural and Domestic Groundwater Contamination

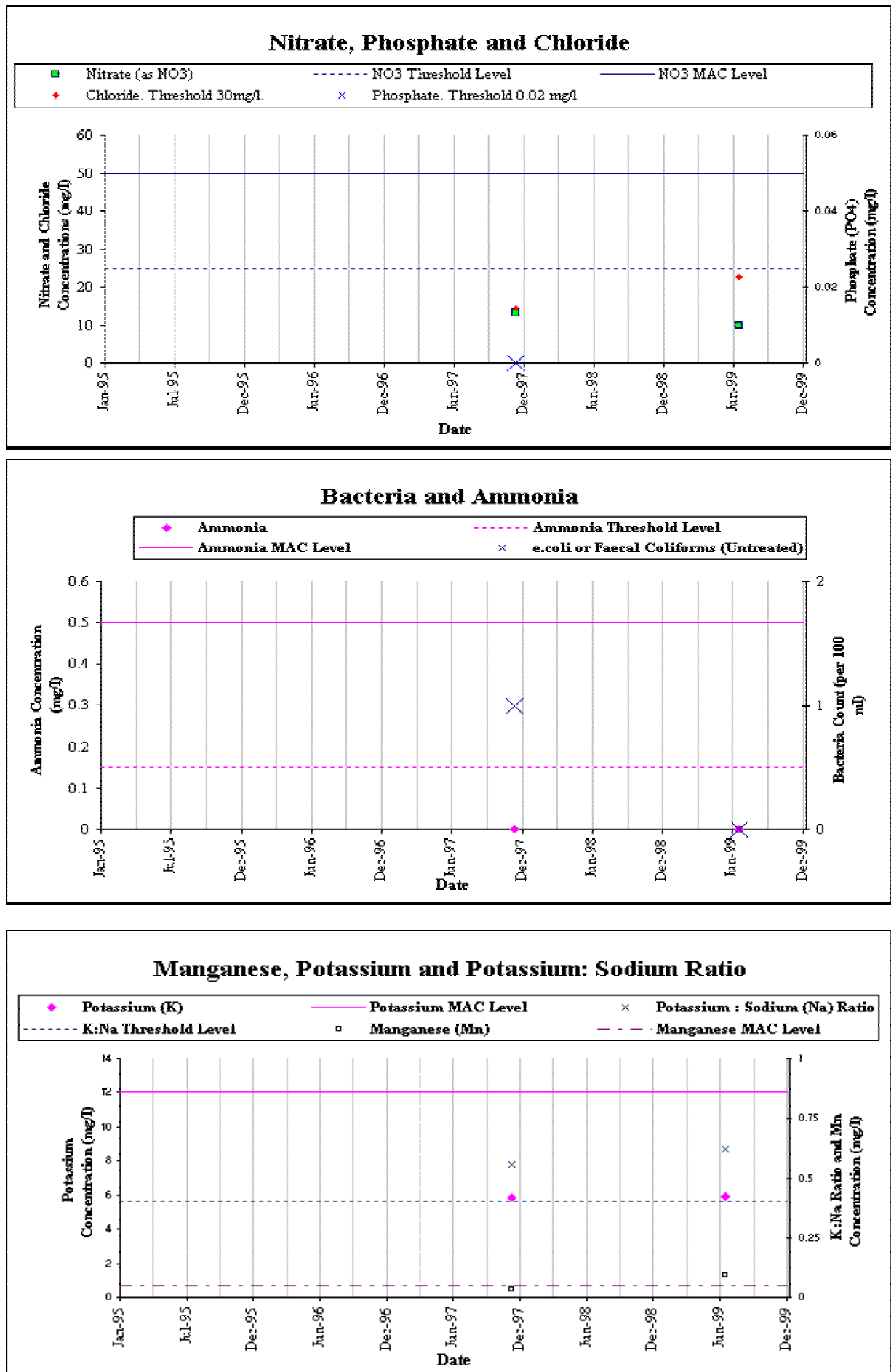


Figure 11-Cloghogue Springs, Ballinakill
Key indicators of agricultural and Domestic Groundwater Contamination

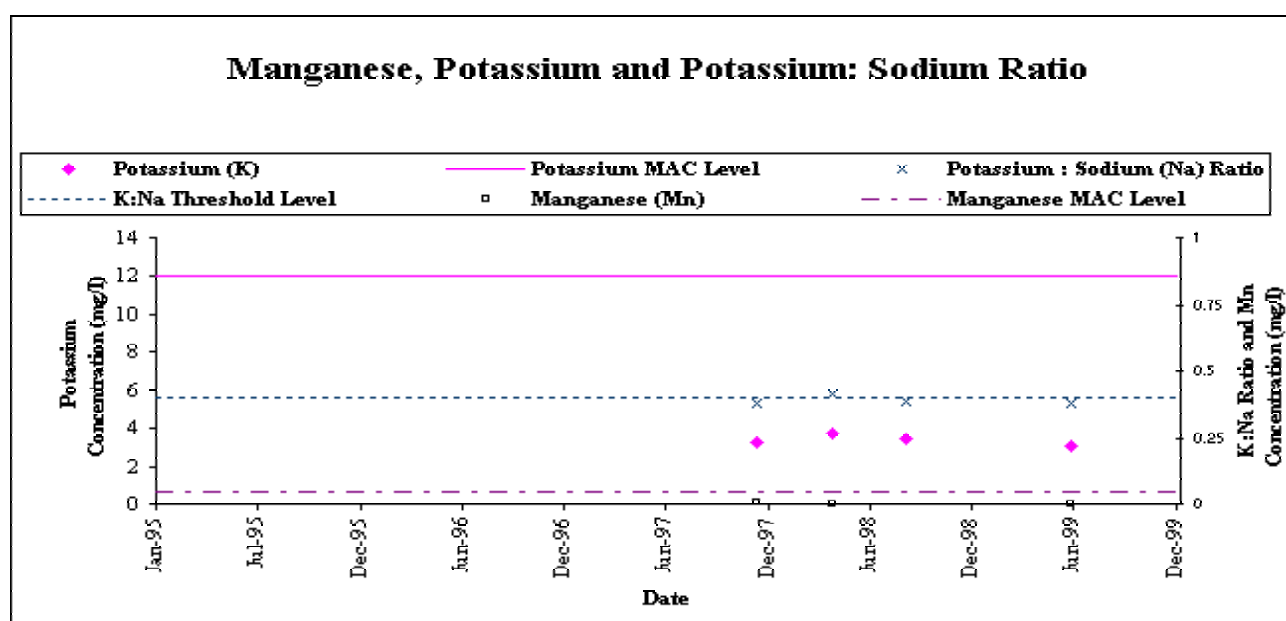
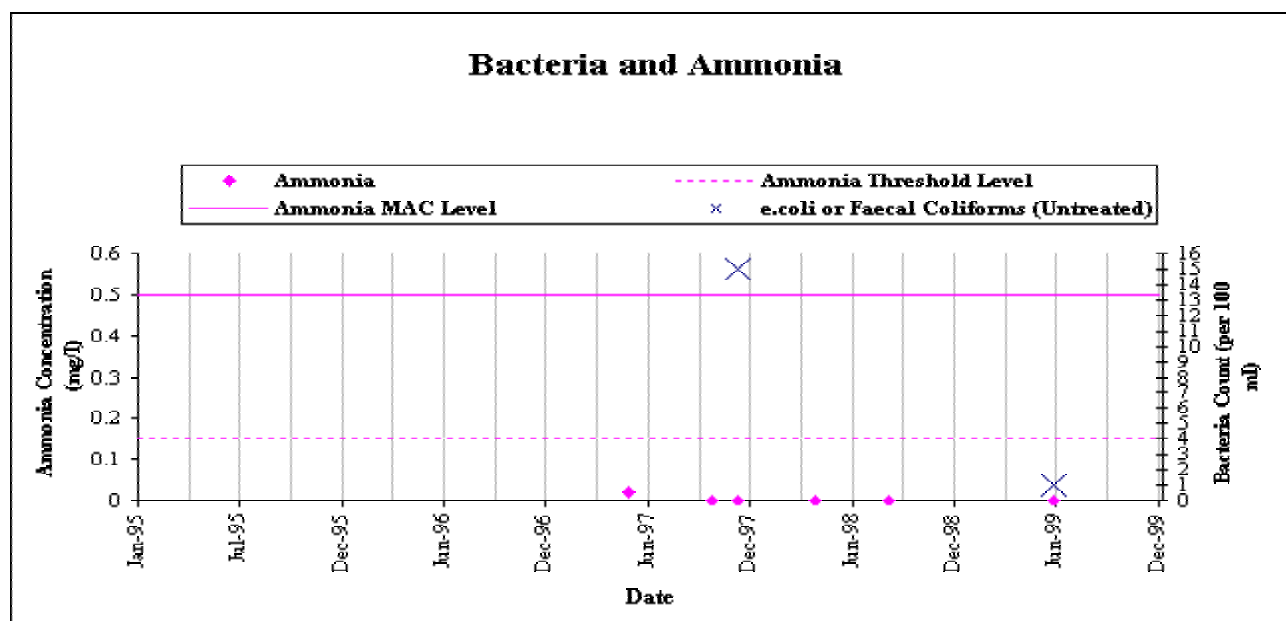
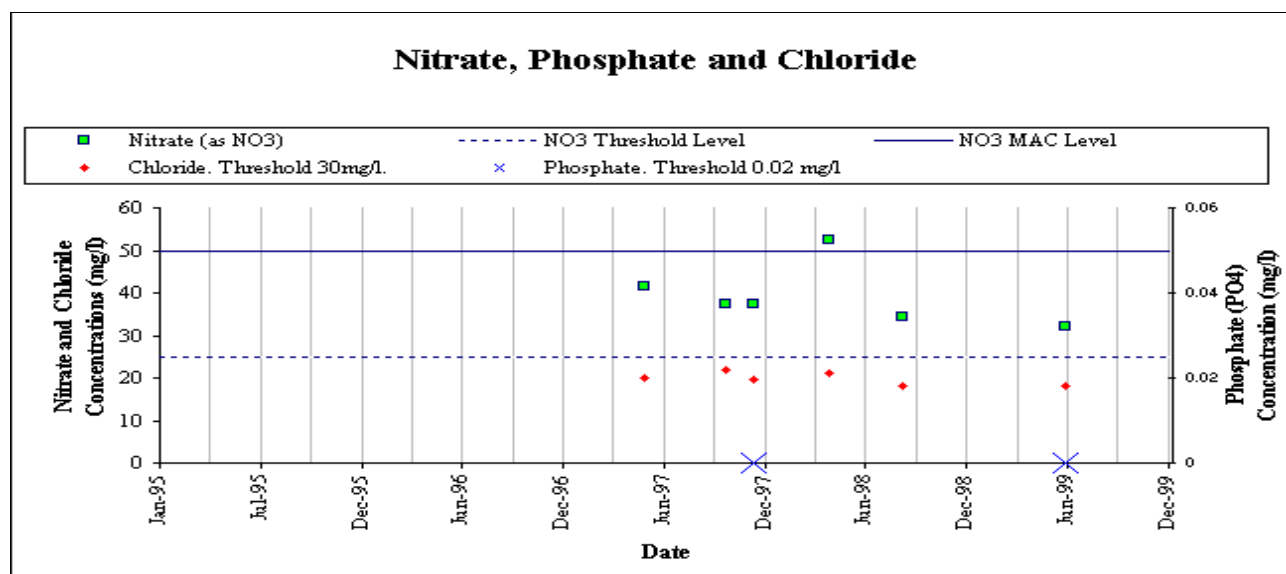


Figure 12- Coolenagh
Key indicators of agricultural and Domestic Groundwater Contamination

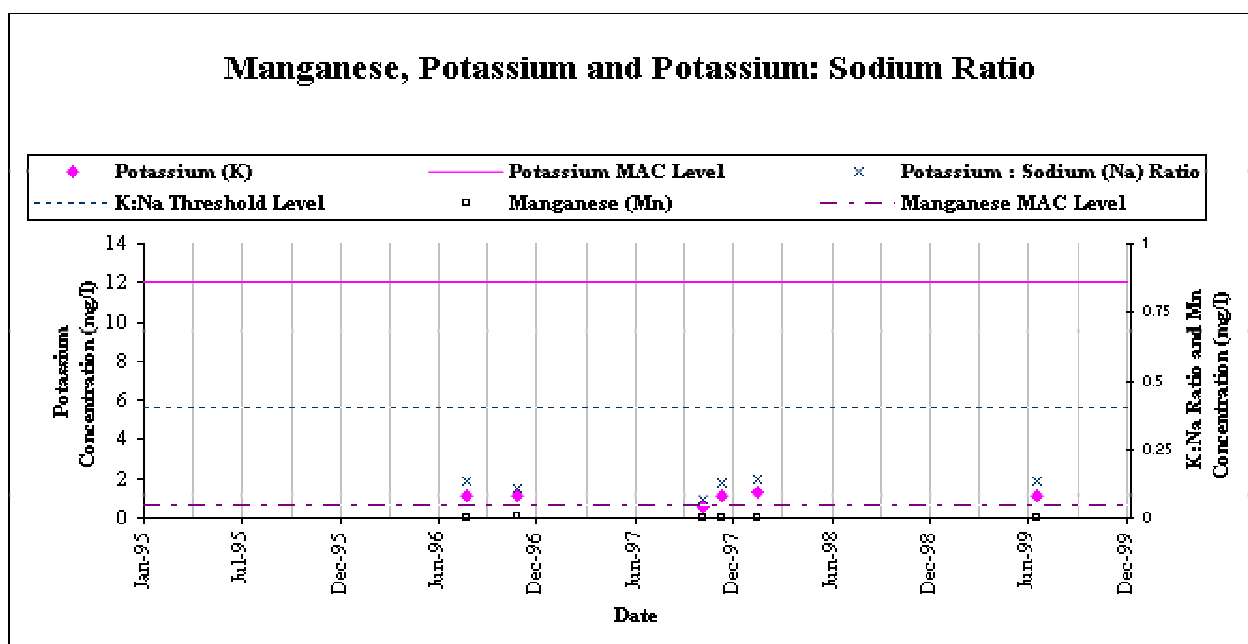
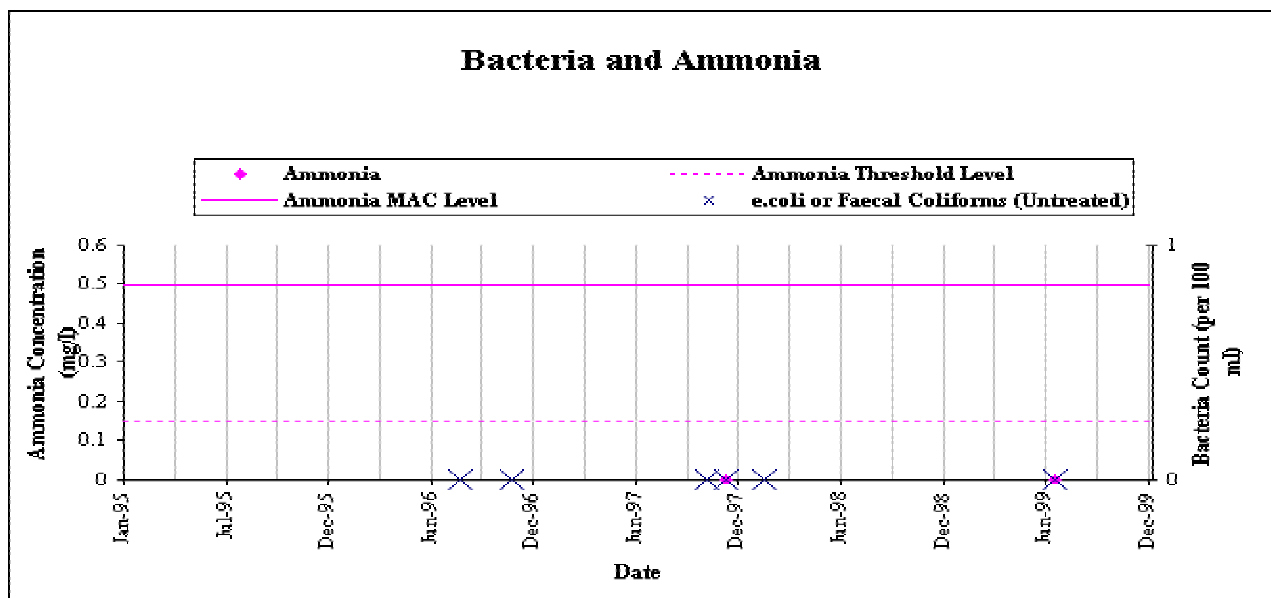
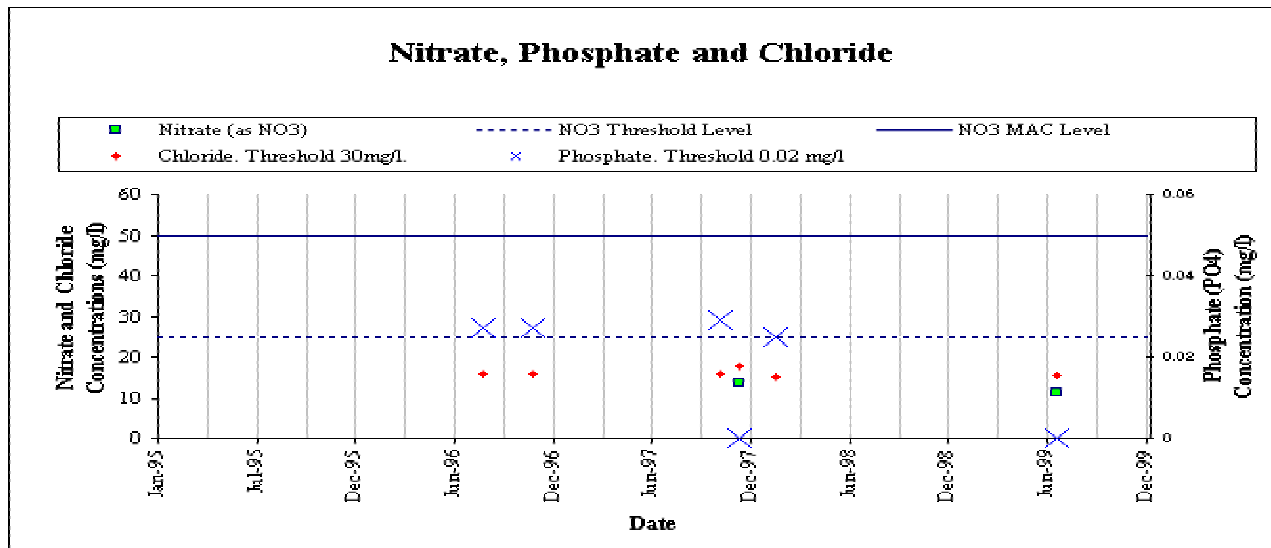


Figure 13- Coolfin, Ballacolla
Key indicators of agricultural and Domestic Groundwater Contamination

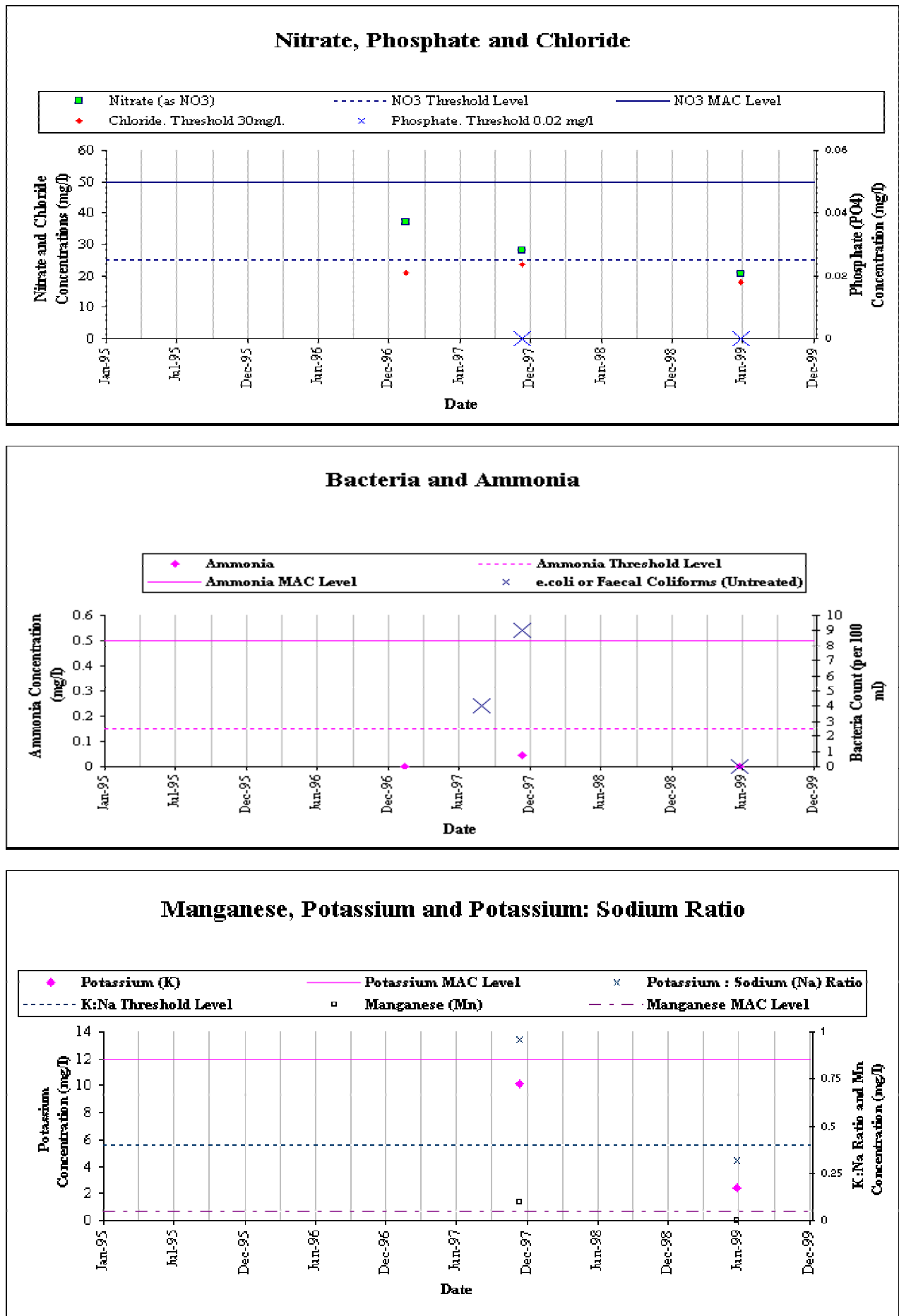


Figure 14-Cullahill GWS
Key indicators of agricultural and Domestic Groundwater Contamination

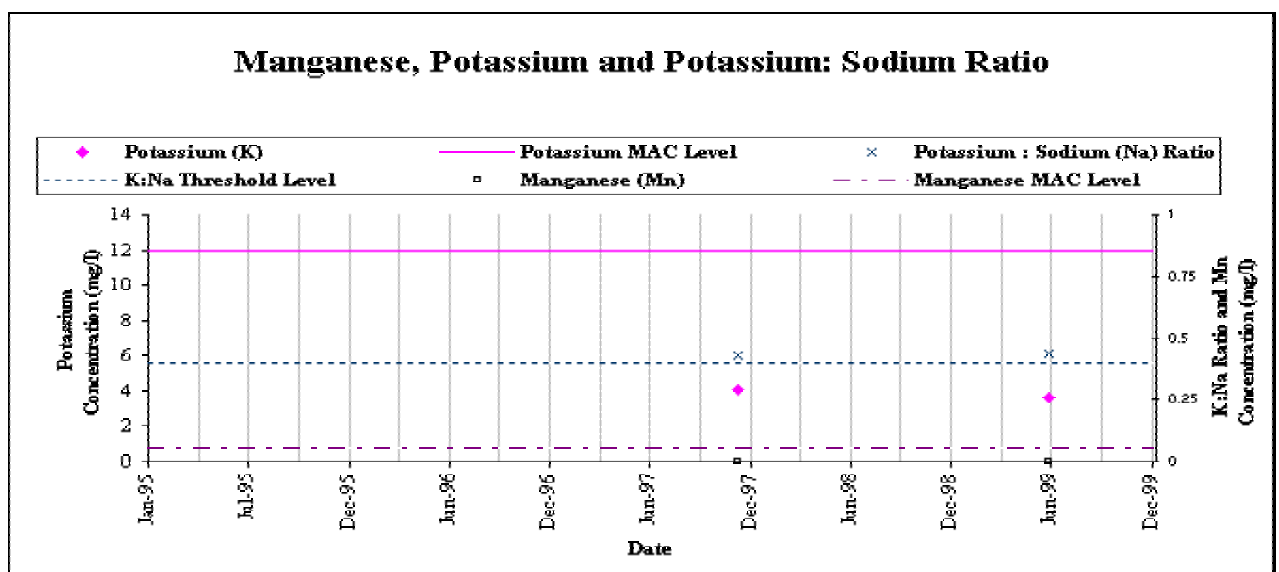
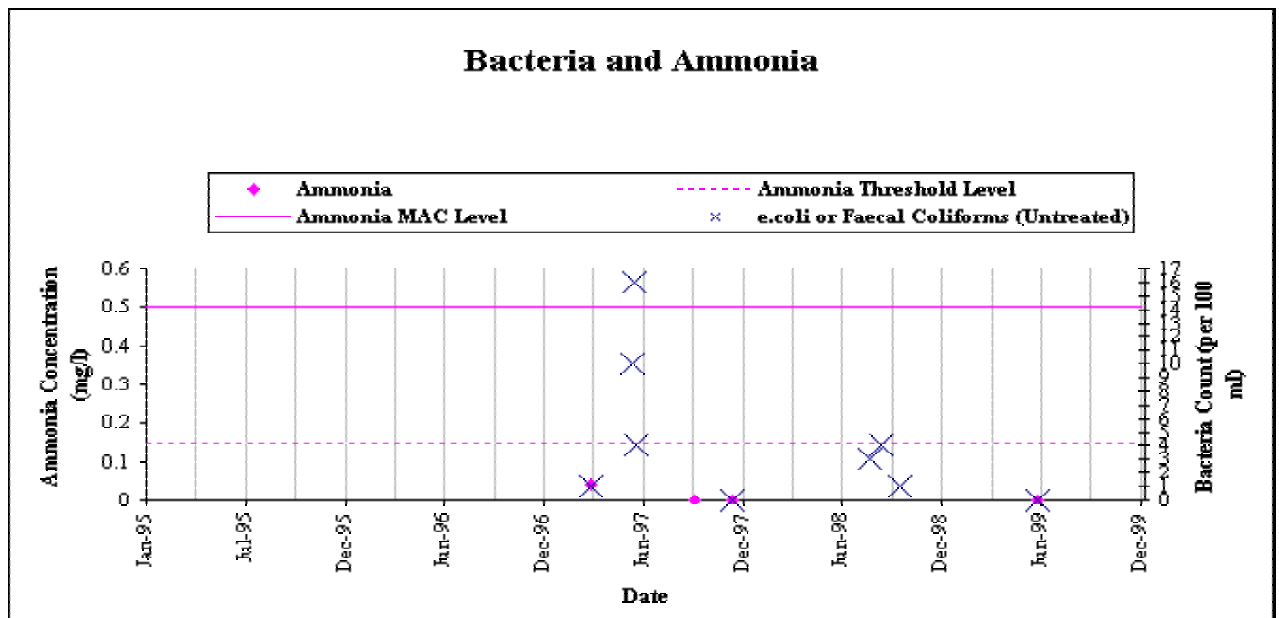
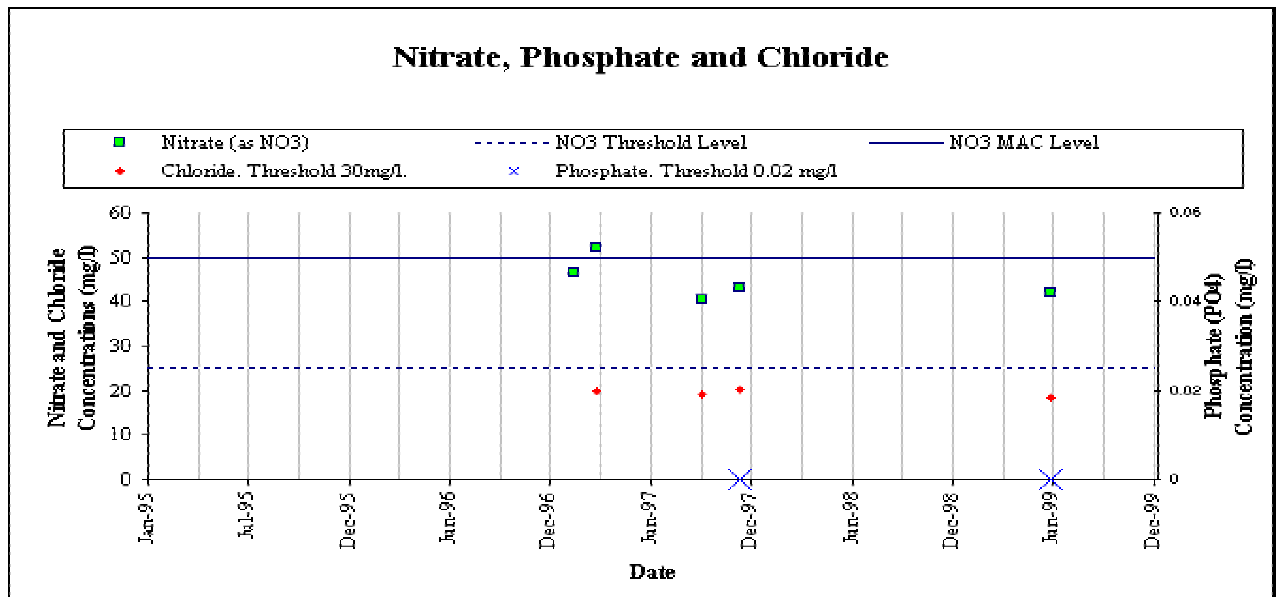


Figure 15-Dairyhill, Ballacolla
Key indicators of agricultural and Domestic Groundwater Contamination

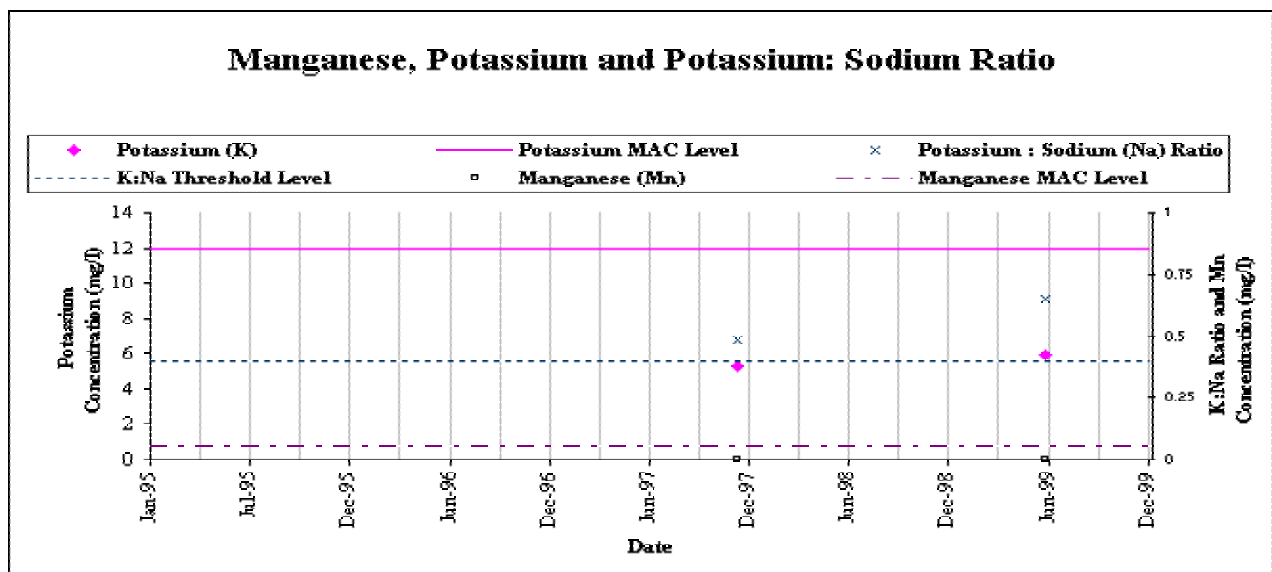
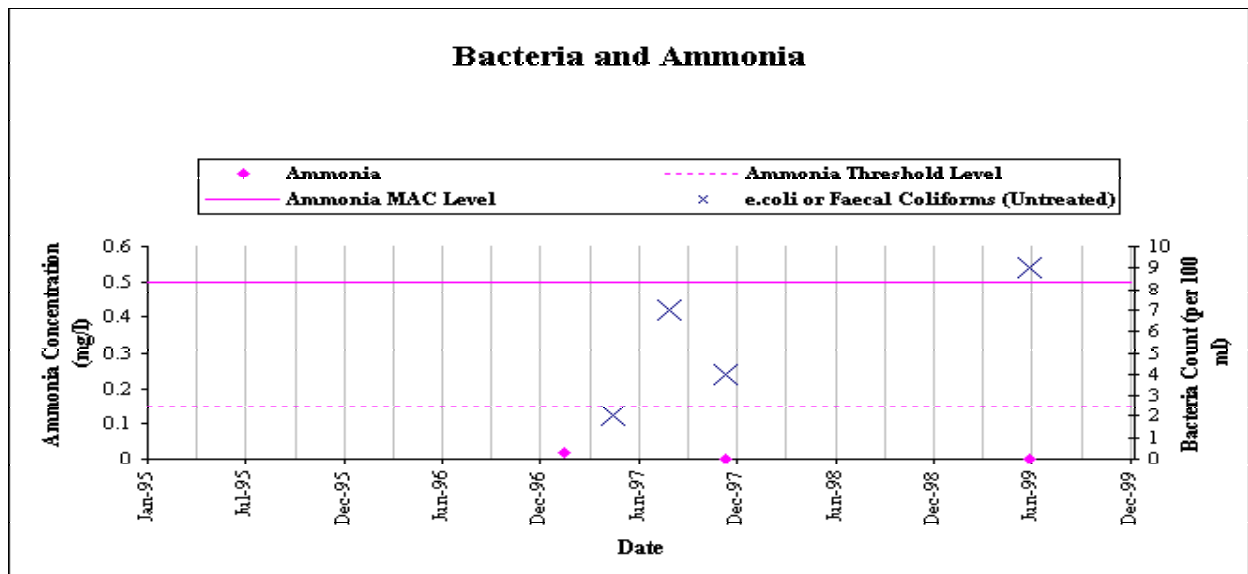
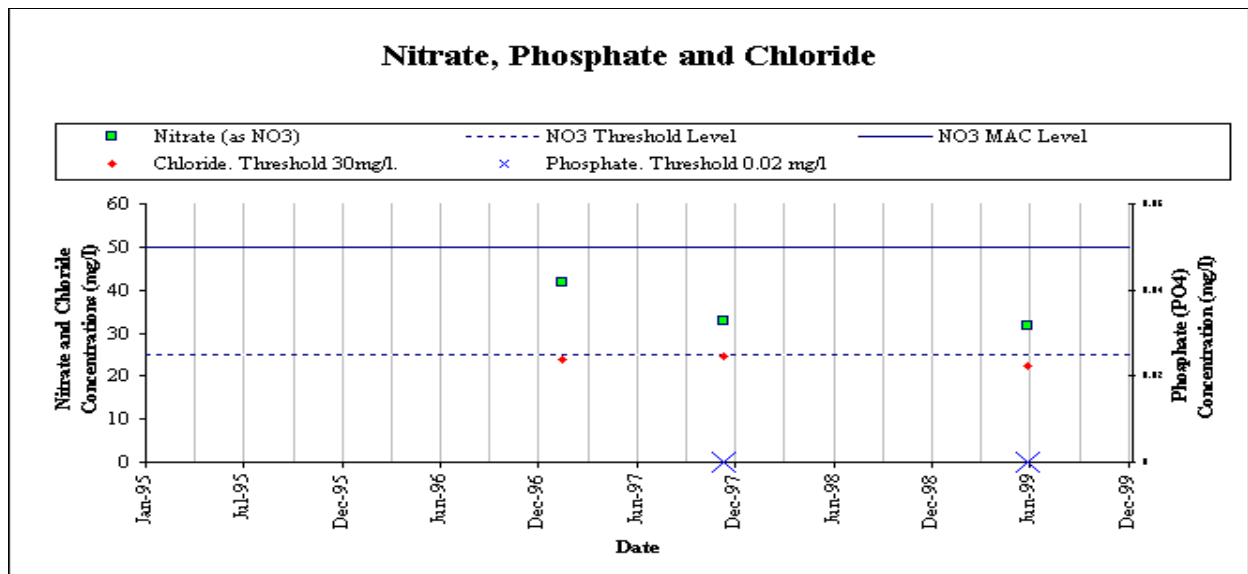


Figure 16-Darkin Well/Straboe
Key indicators of agricultural and Domestic Groundwater Contamination

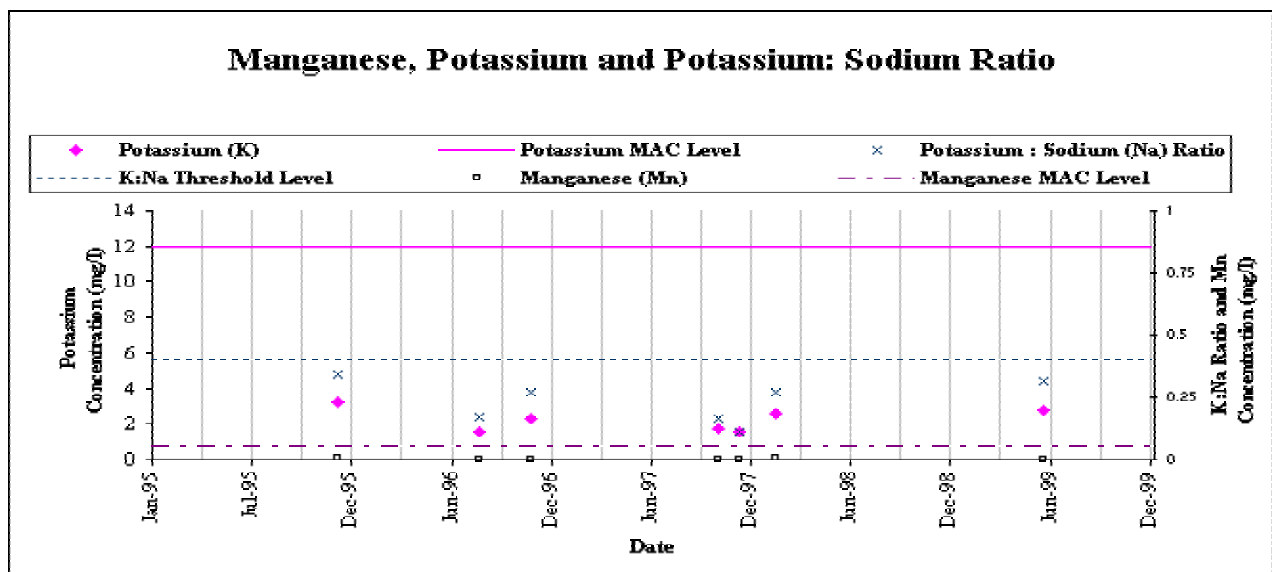
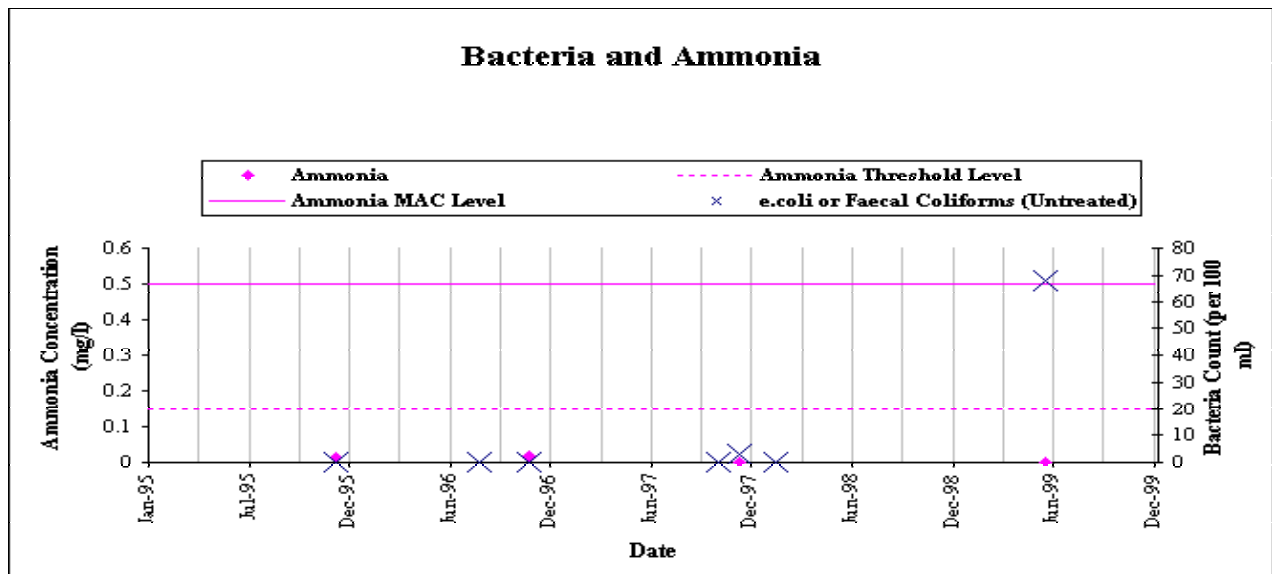
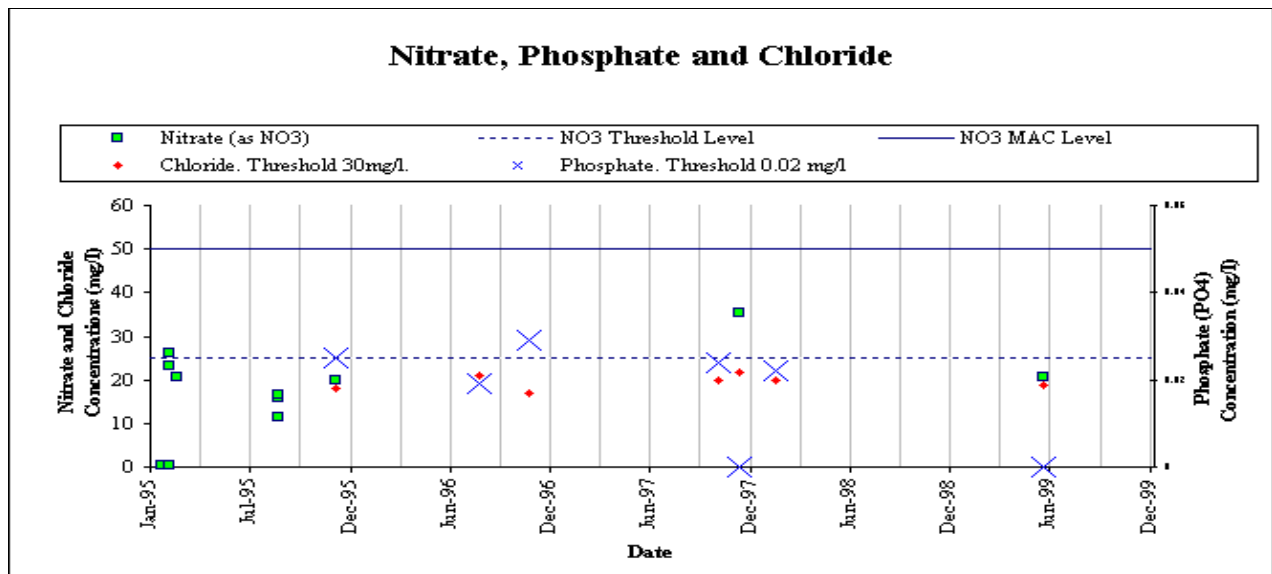


Figure 17-Derrin, Boris-in-Ossory
Key indicators of agricultural and Domestic Groundwater Contamination

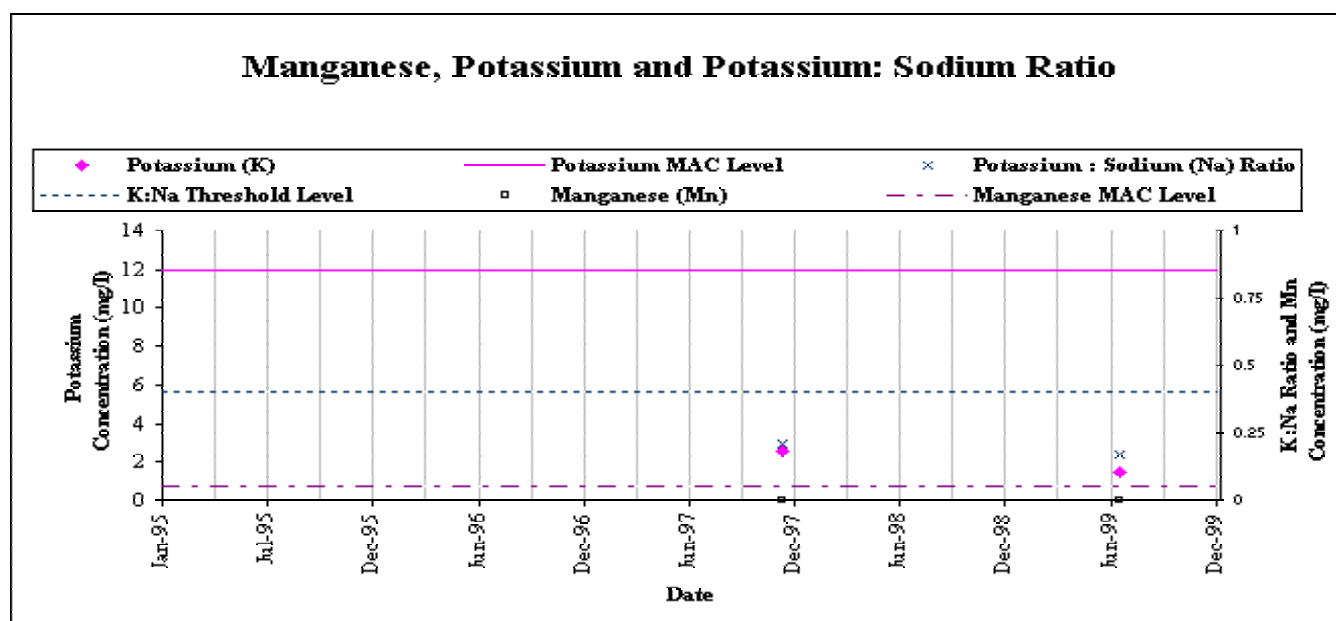
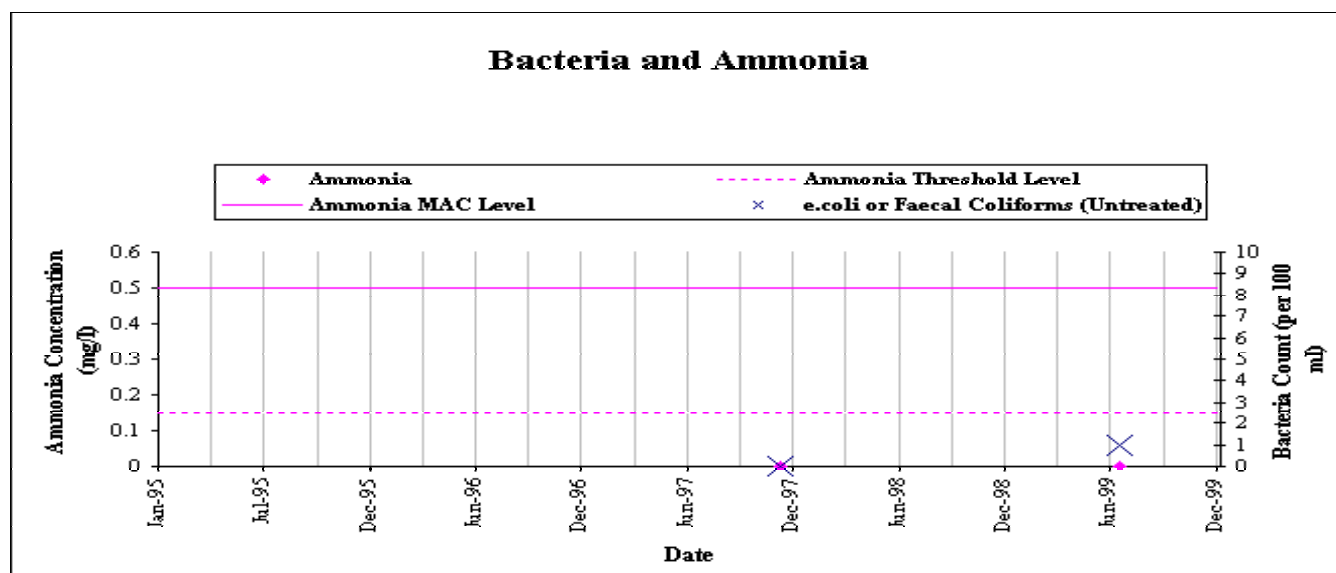
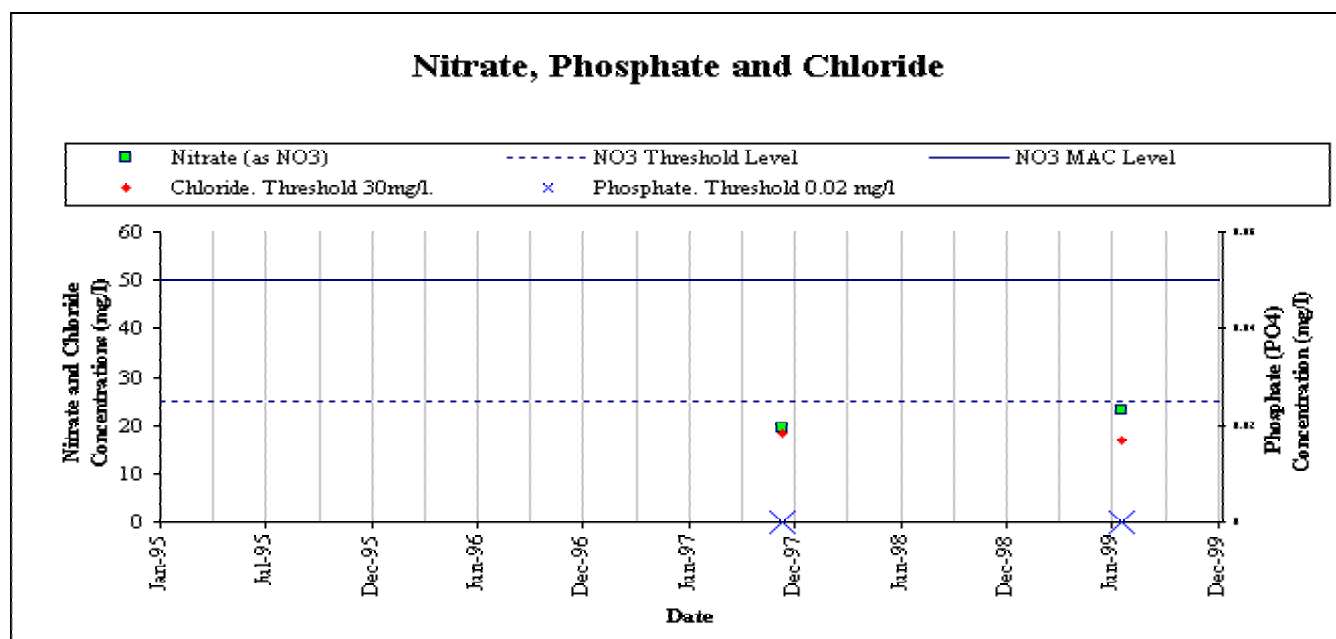


Figure 18-Derryguile, Mountmellick
Key indicators of agricultural and Domestic Groundwater Contamination

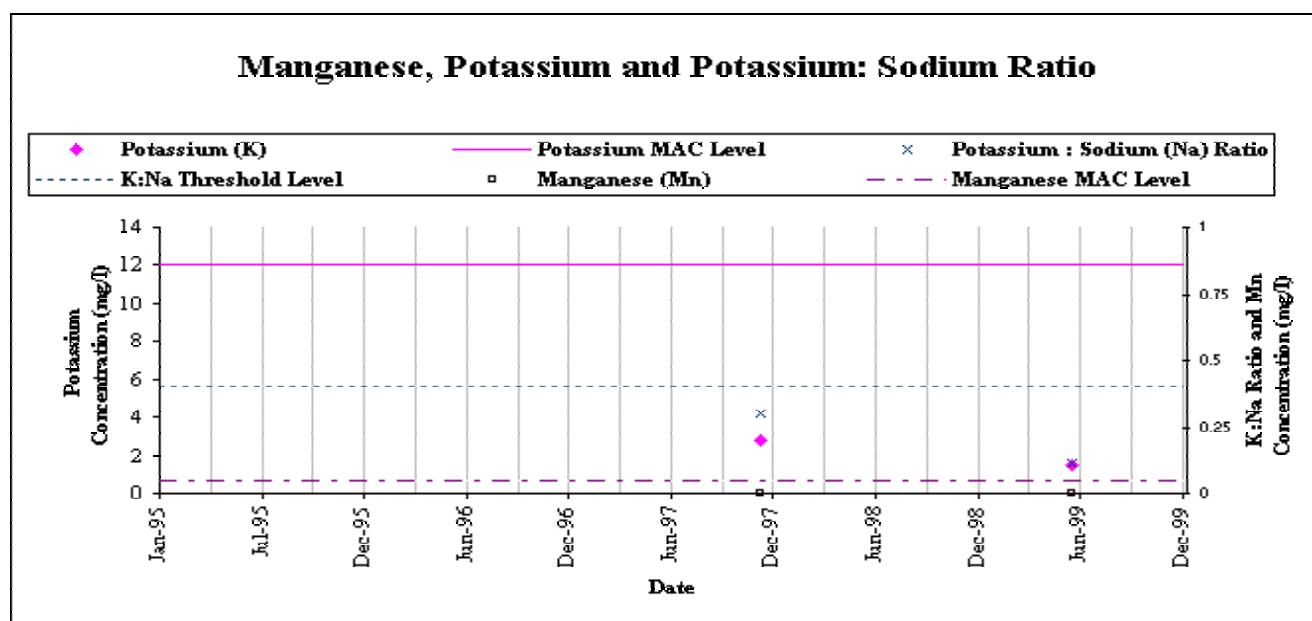
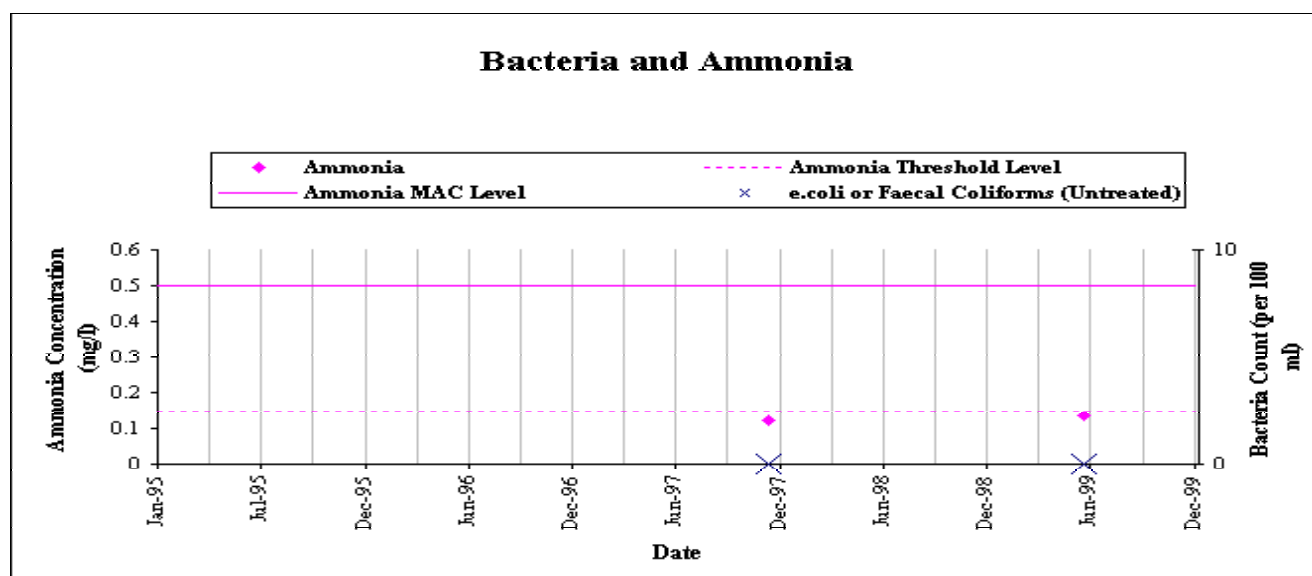
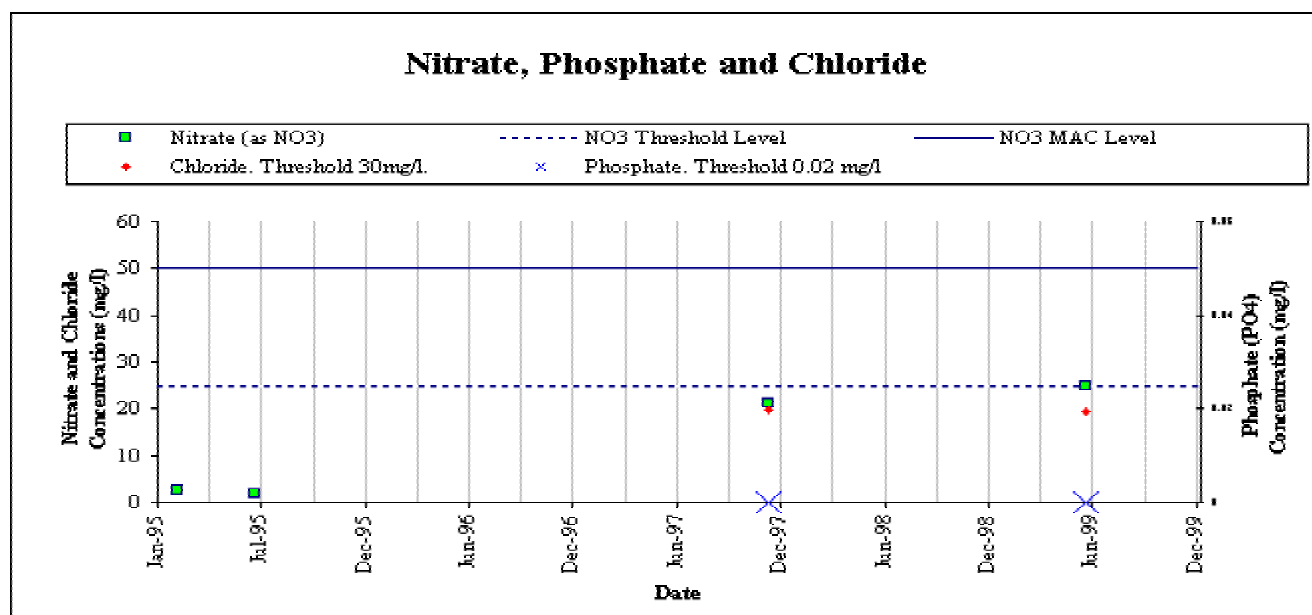


Figure 19-Donaghmore GWS
Key indicators of agricultural and Domestic Groundwater Contamination

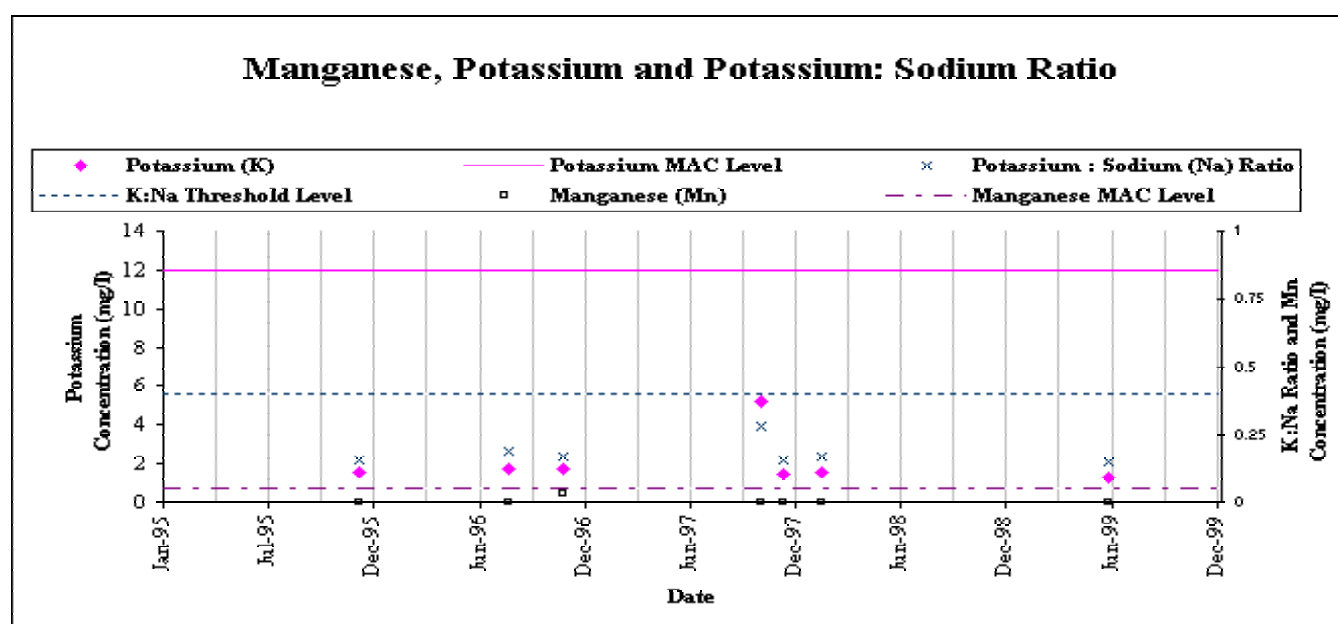
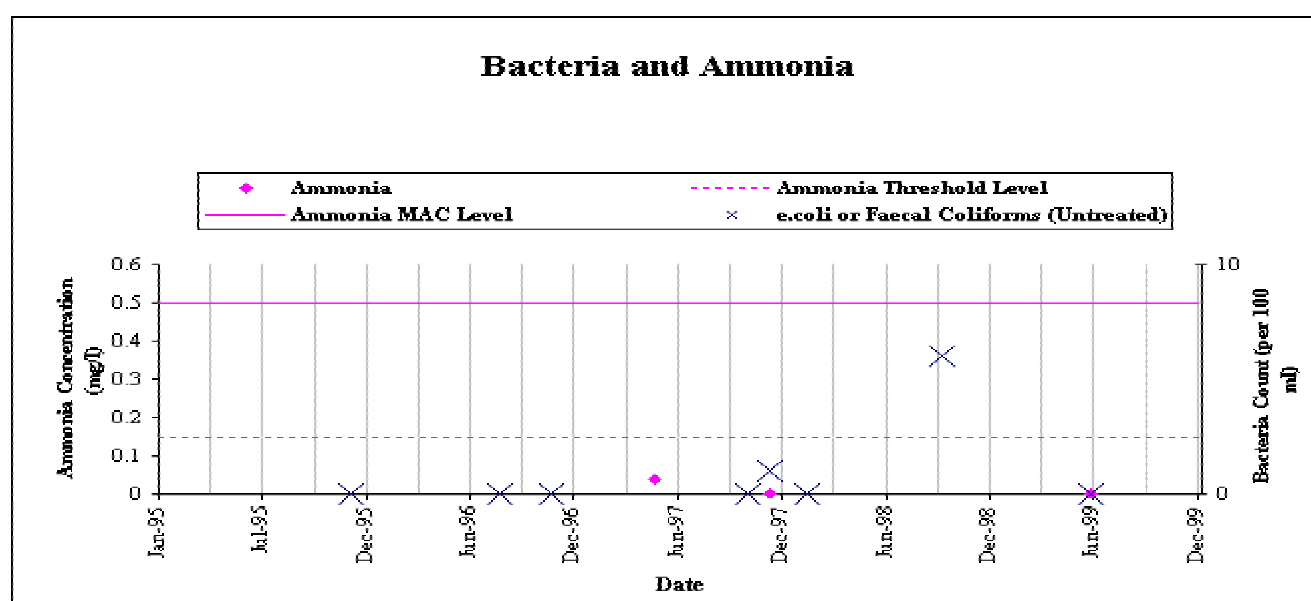
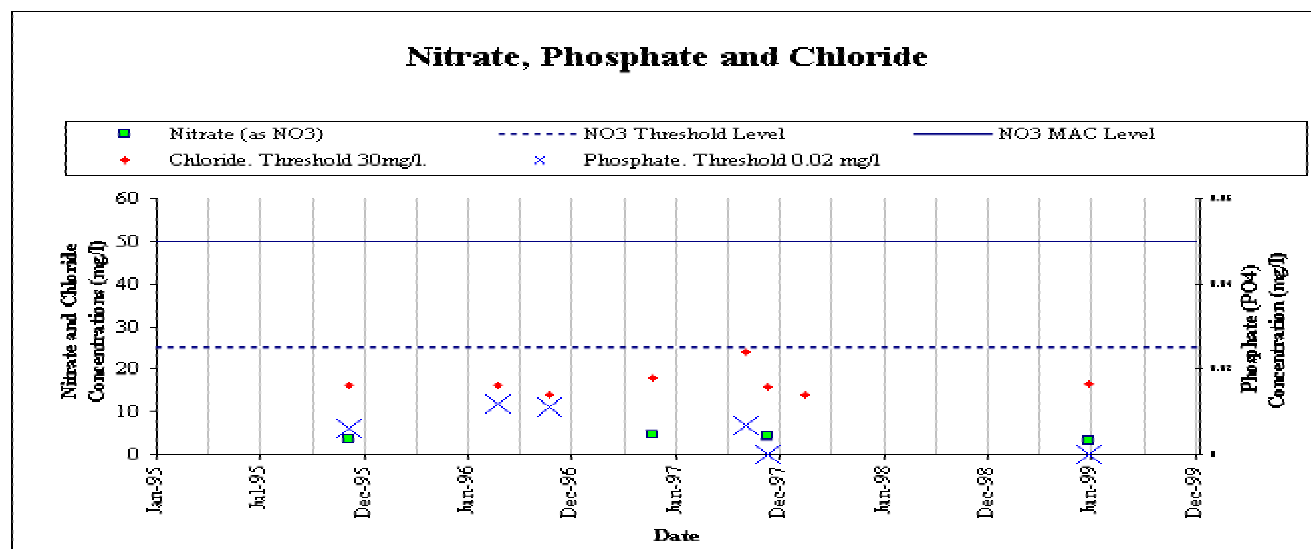


Figure 20-Drim, Mountrath
Key indicators of agricultural and Domestic Groundwater Contamination

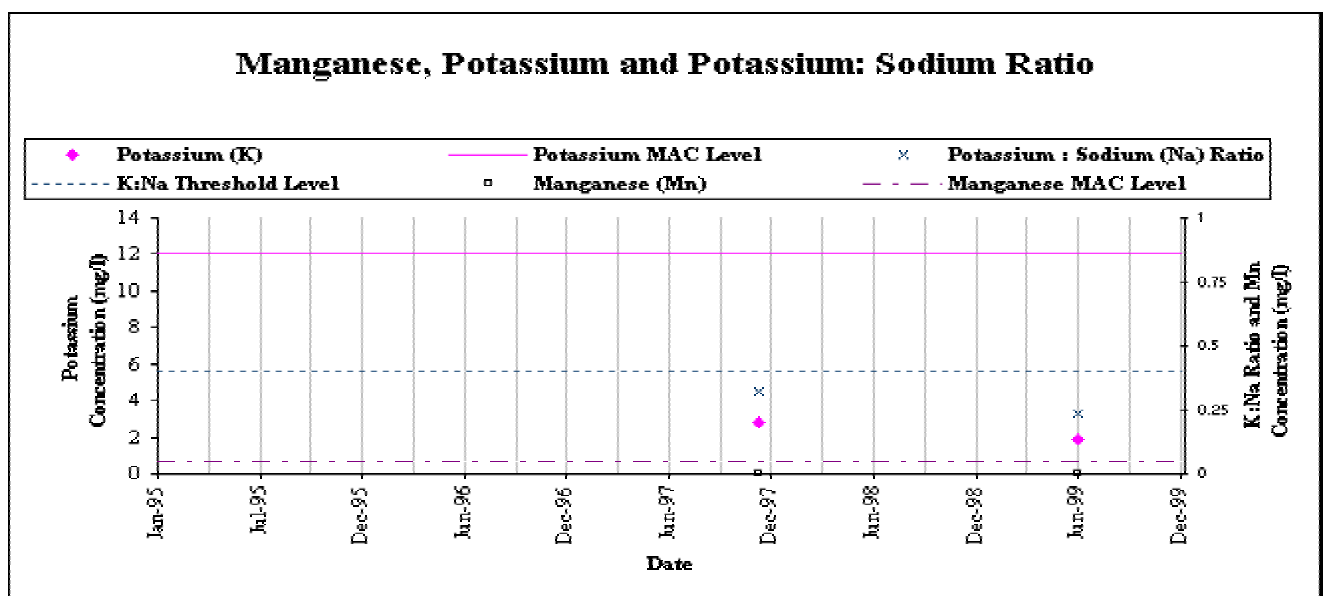
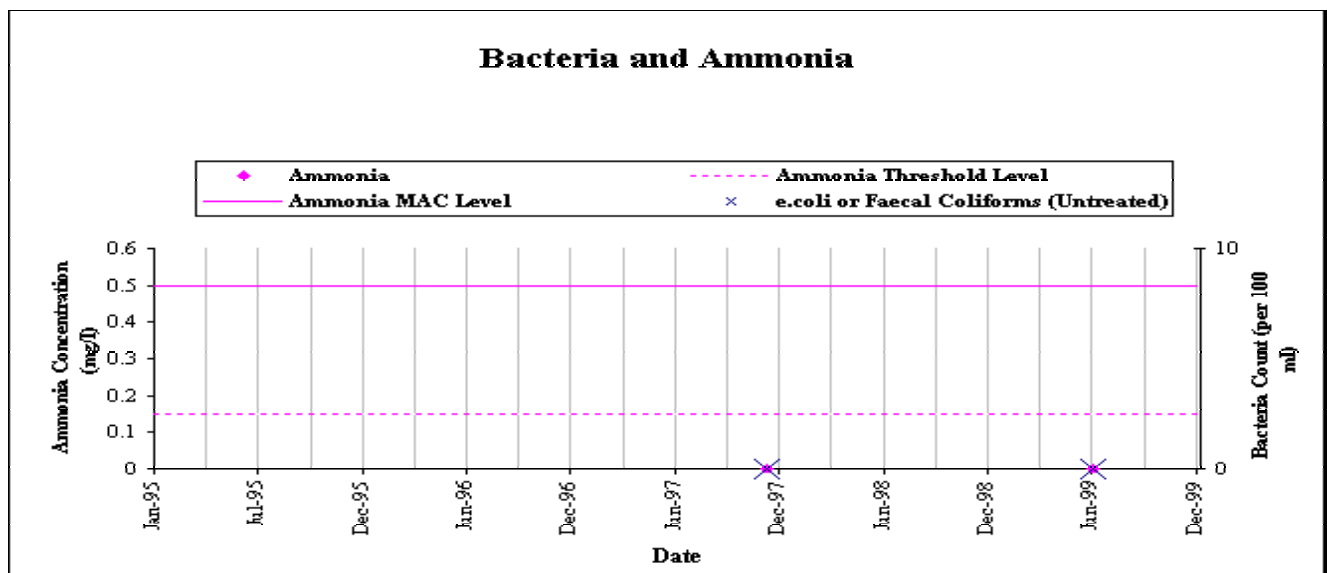
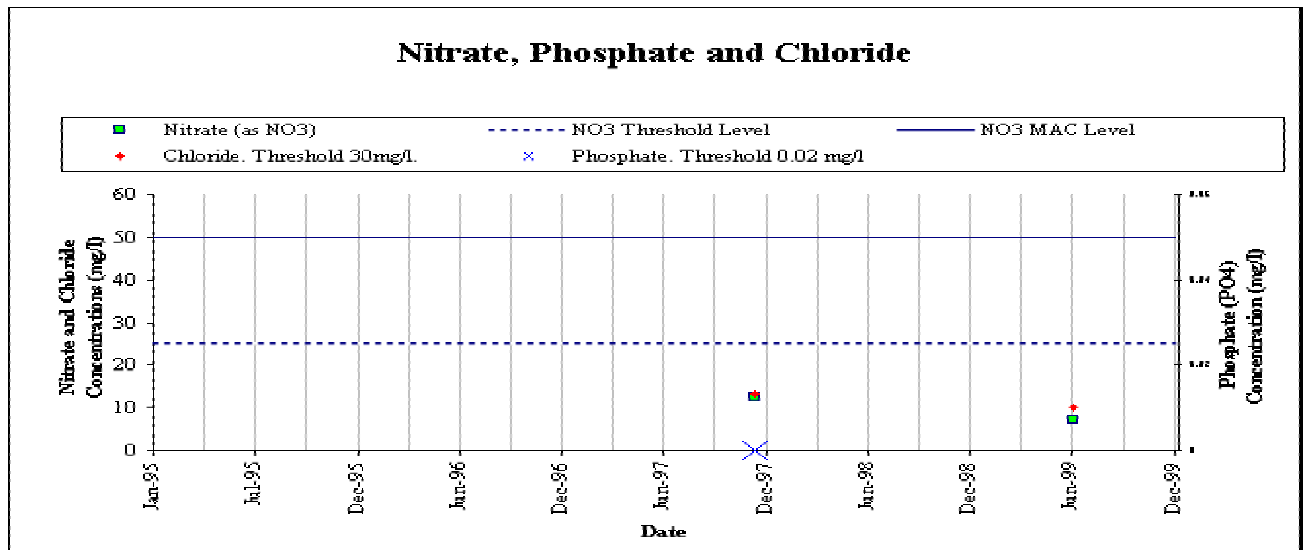


Figure 21-Durrow Convent
Key indicators of agricultural and Domestic Groundwater Contamination

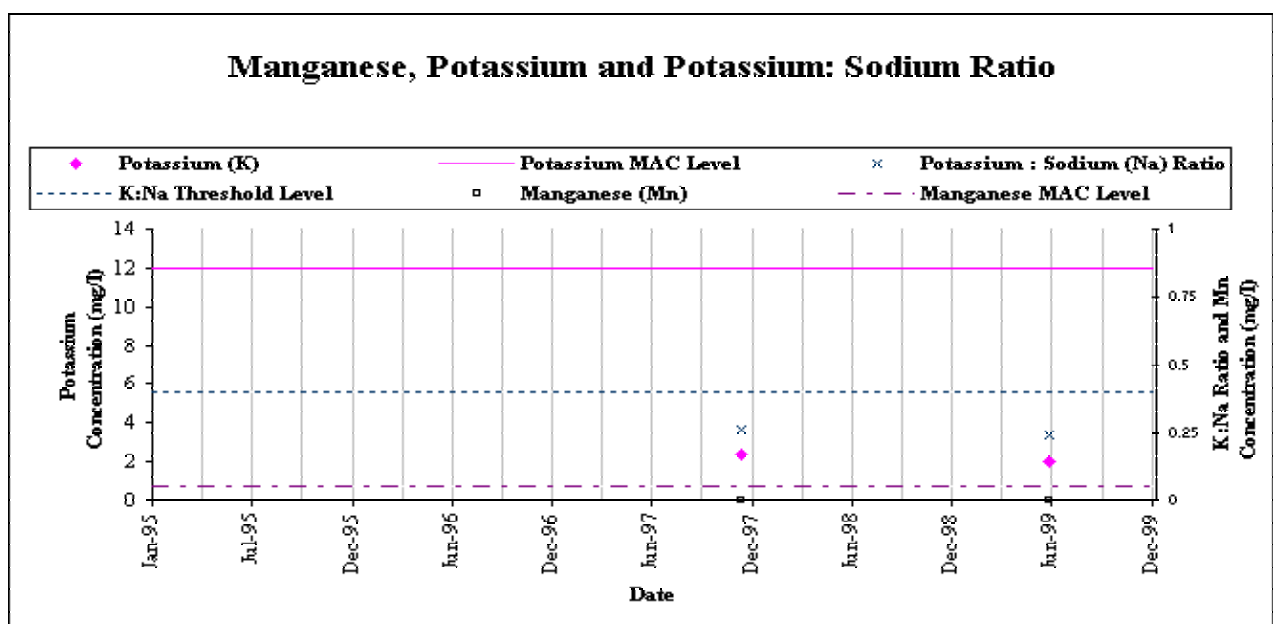
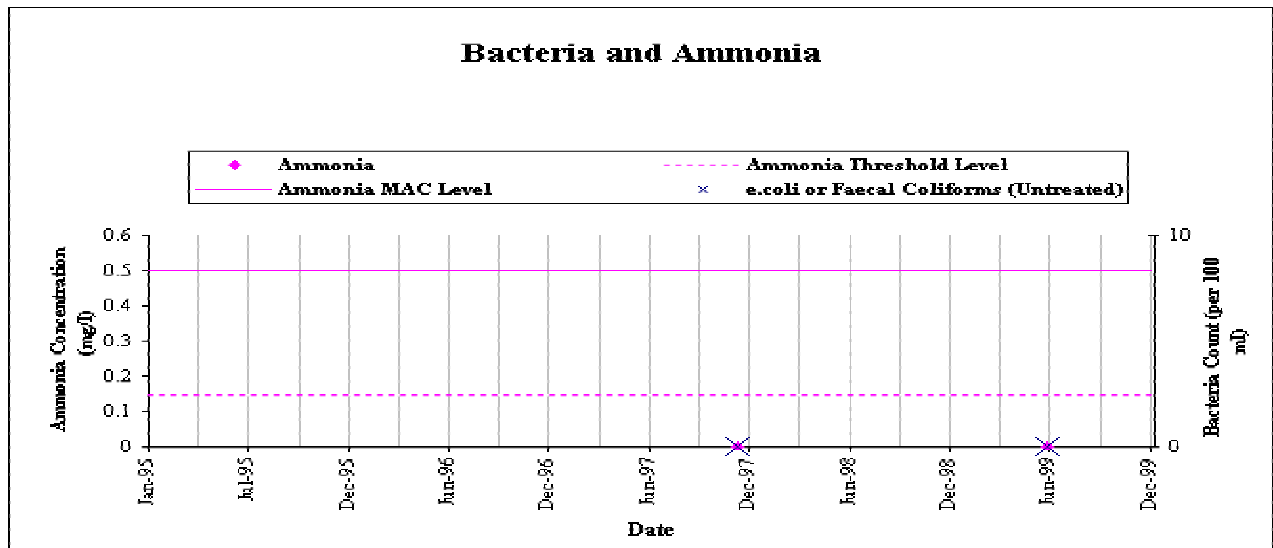
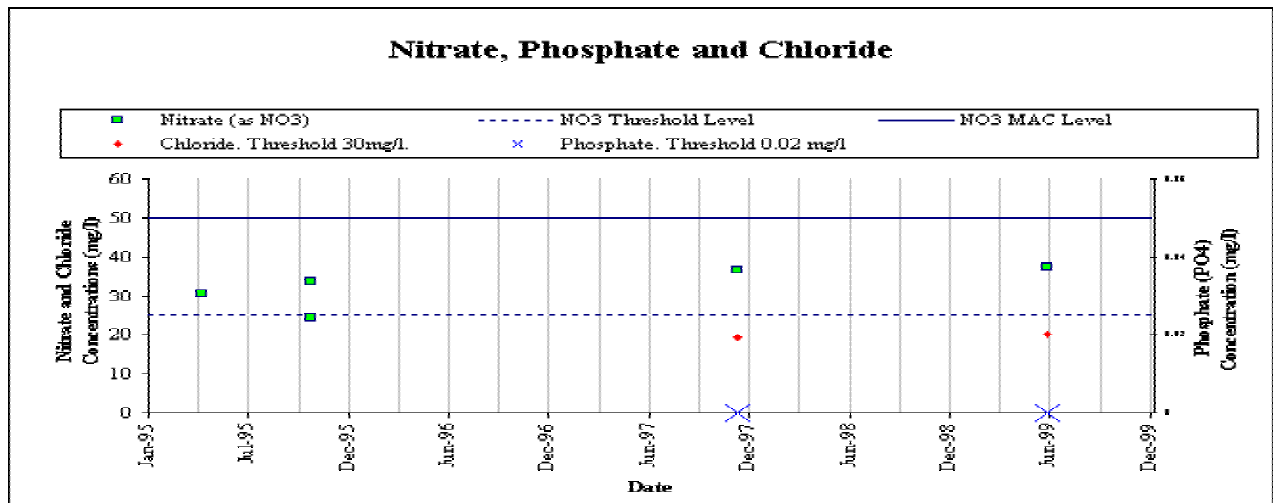


Figure 22- Emo
Key indicators of agricultural and Domestic Groundwater Contamination

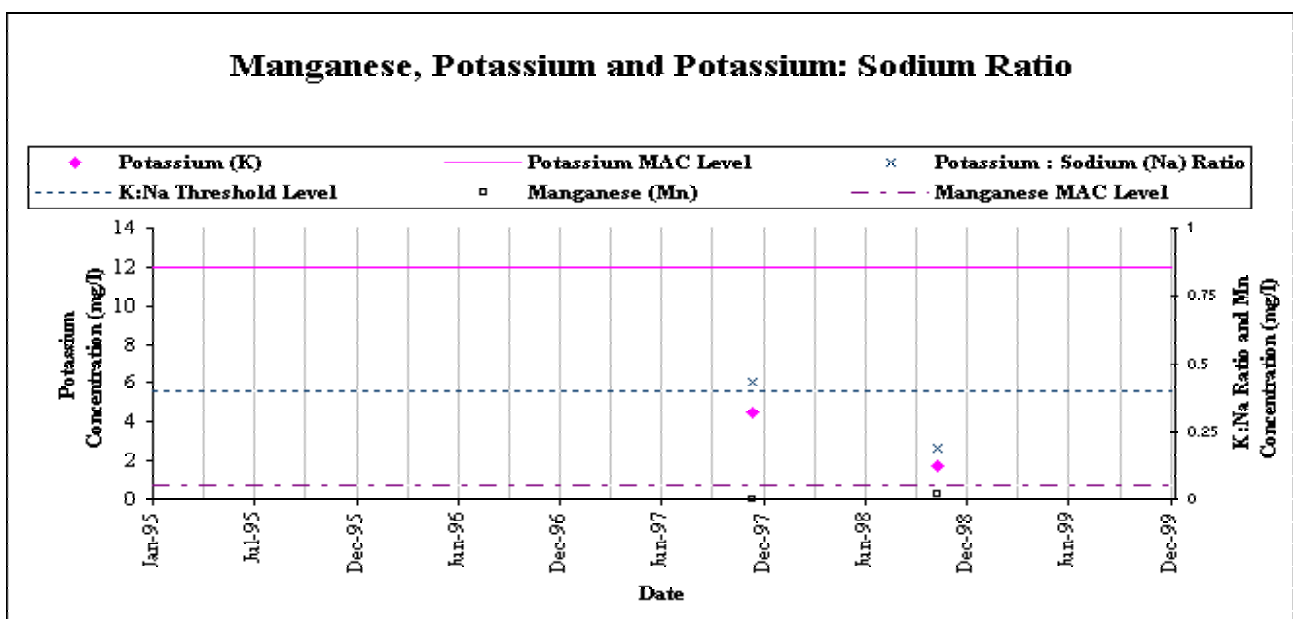
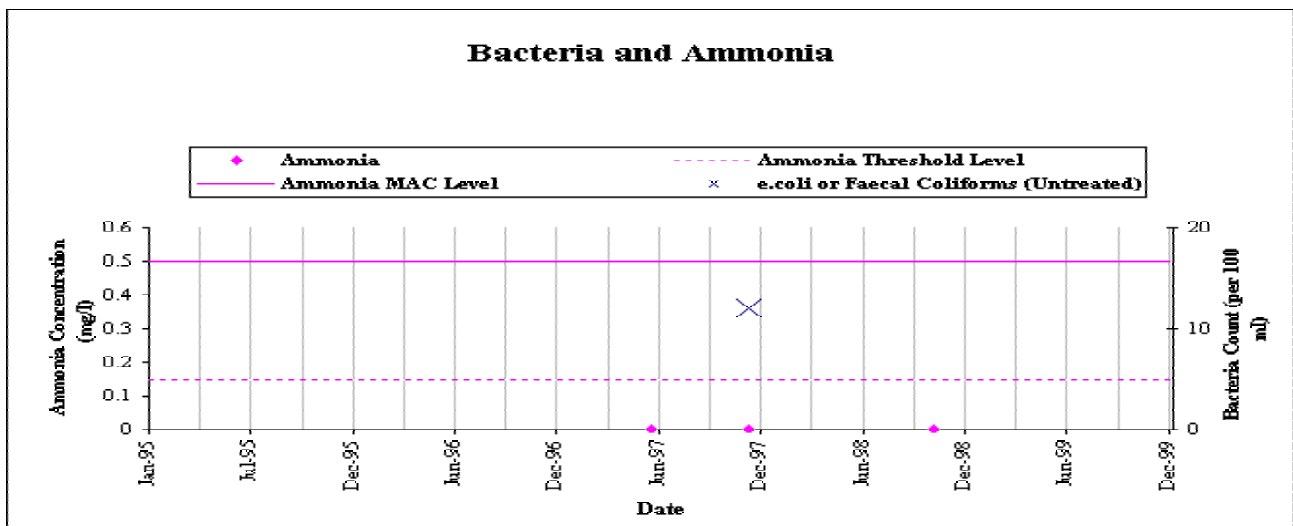
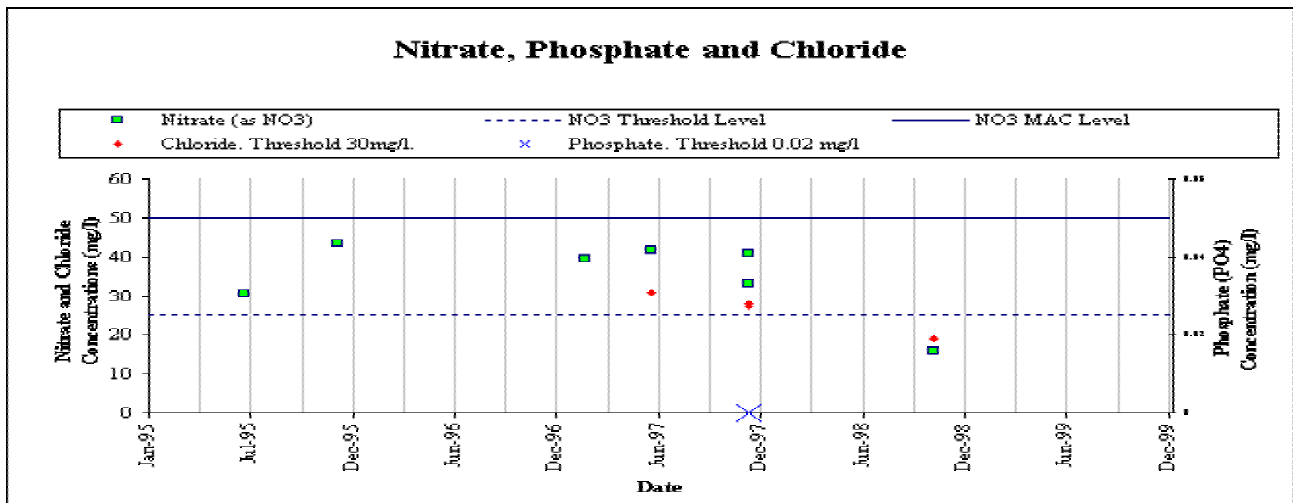
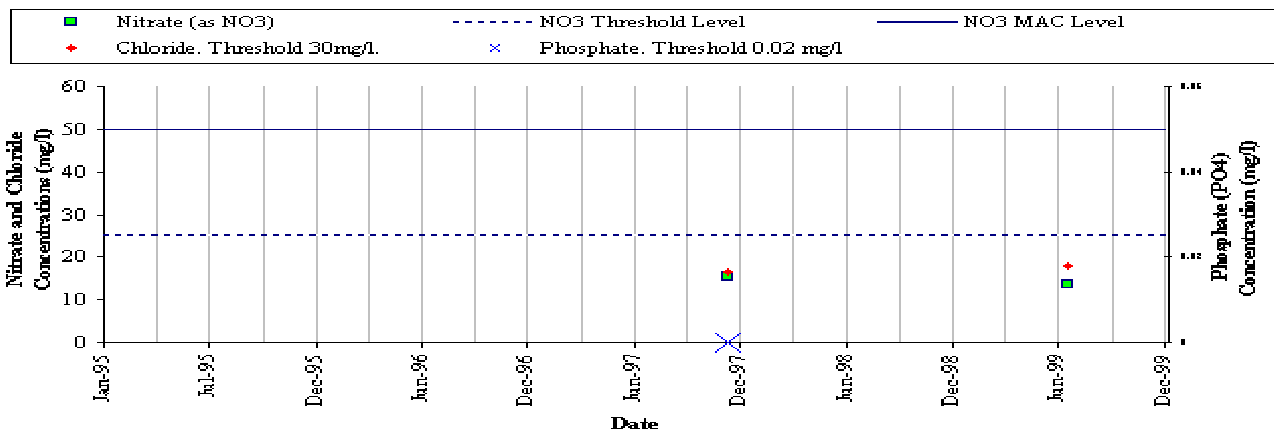
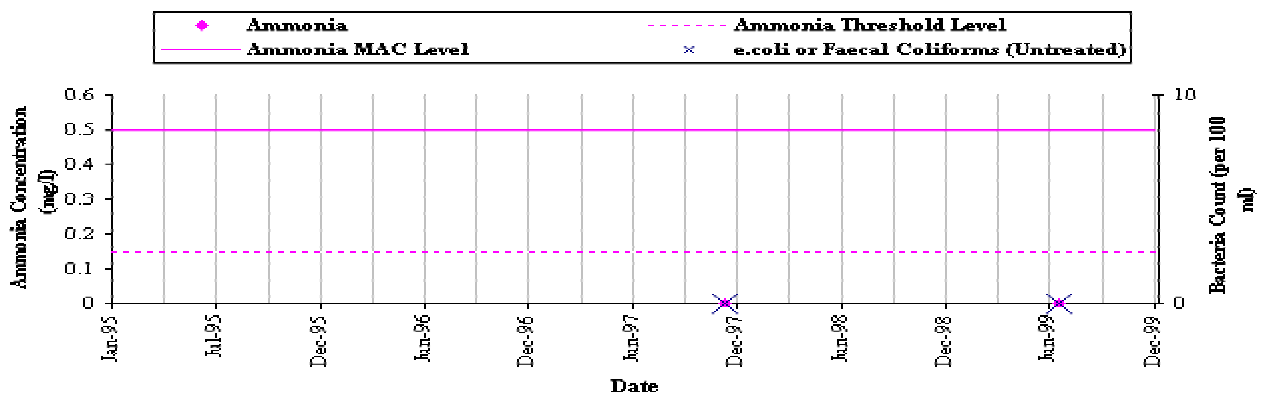


Figure 23-Errill A GWS
Key indicators of agricultural and Domestic Groundwater Contamination

Nitrate, Phosphate and Chloride



Bacteria and Ammonia



Manganese, Potassium and Potassium: Sodium Ratio

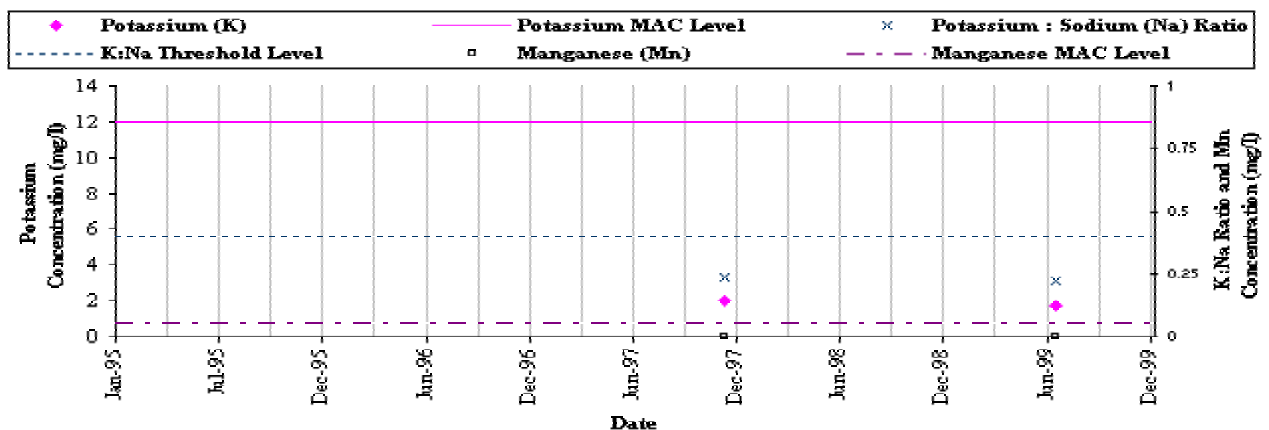


Figure 24-Errill B GWS
Key indicators of agricultural and Domestic Groundwater Contamination

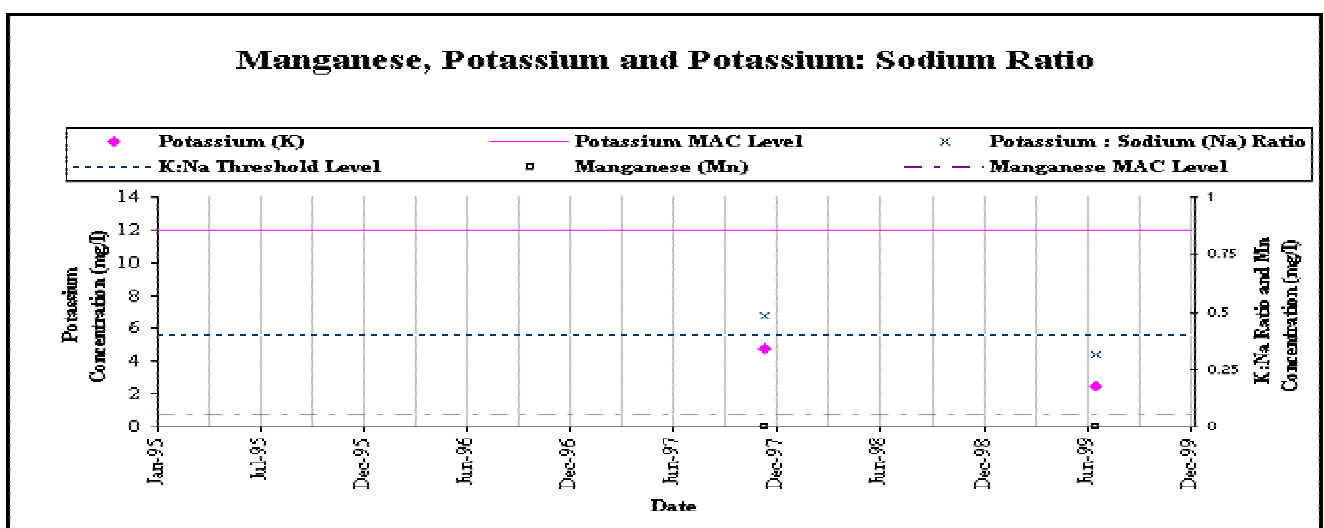
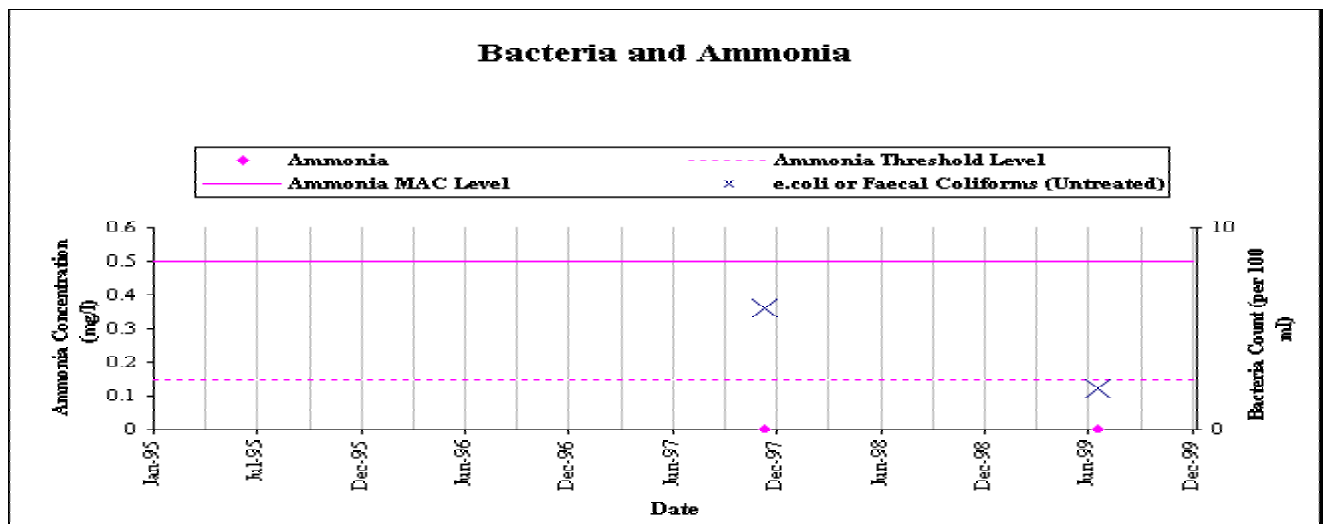
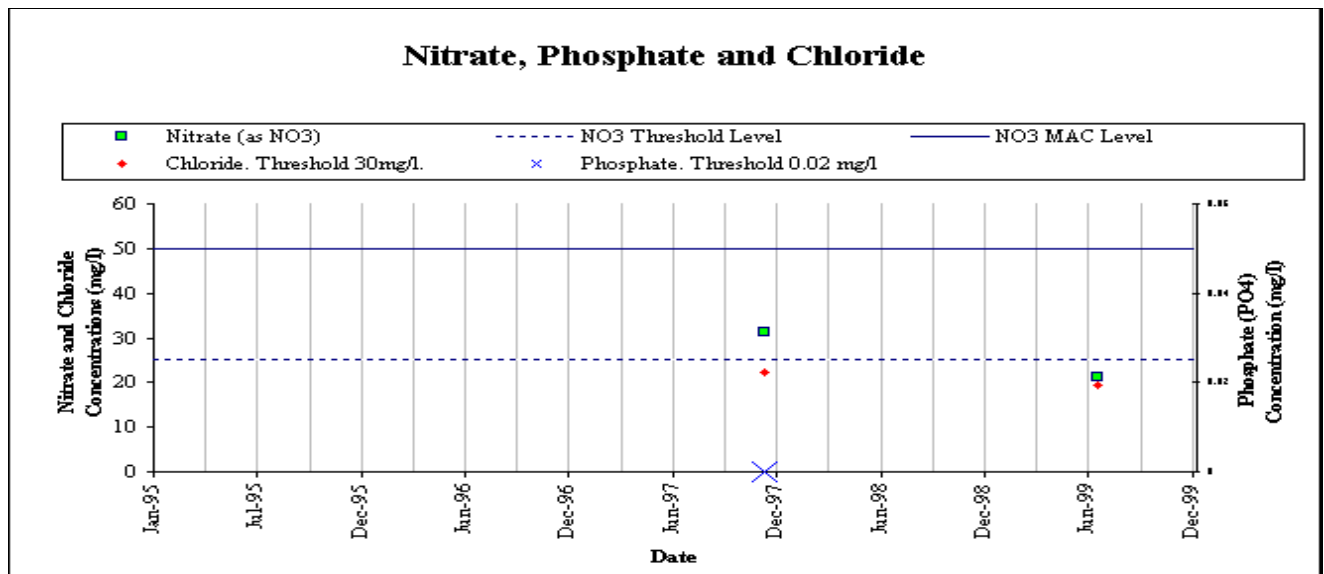


Figure 25-Fermoyle, Ballinakill
Key indicators of agricultural and Domestic Groundwater Contamination

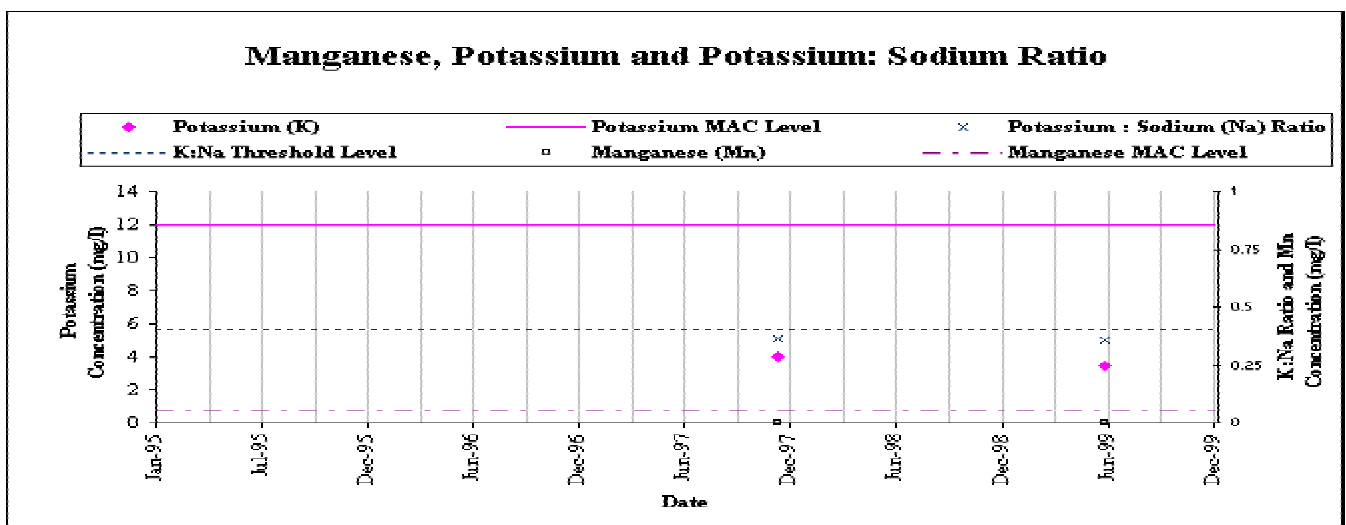
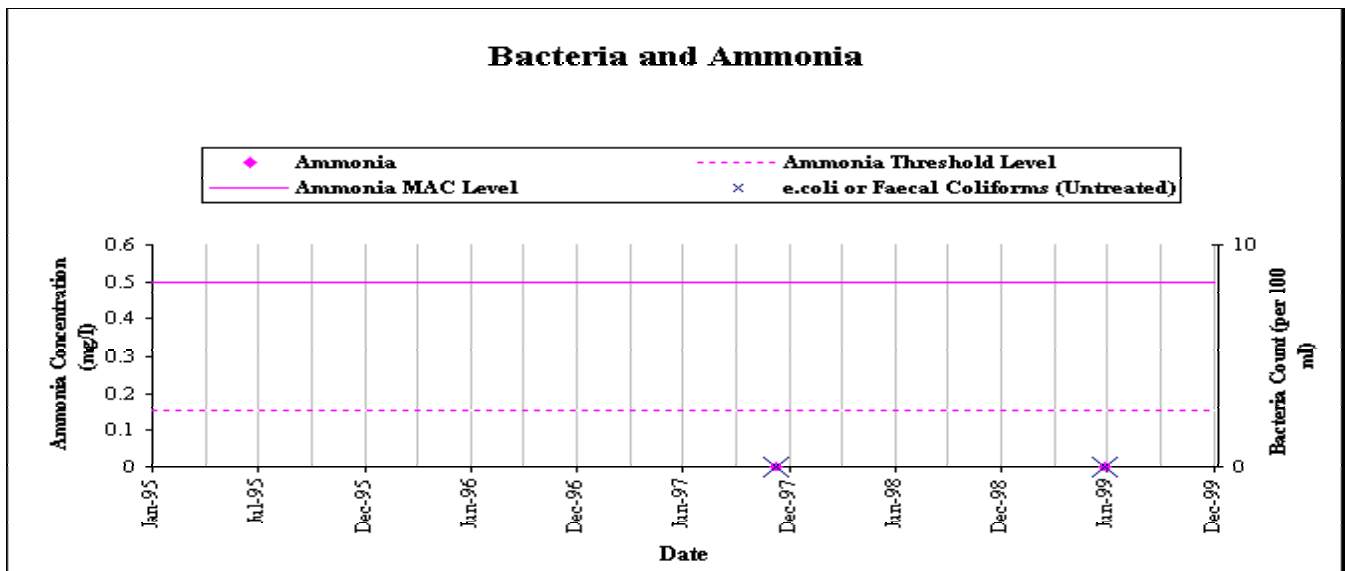
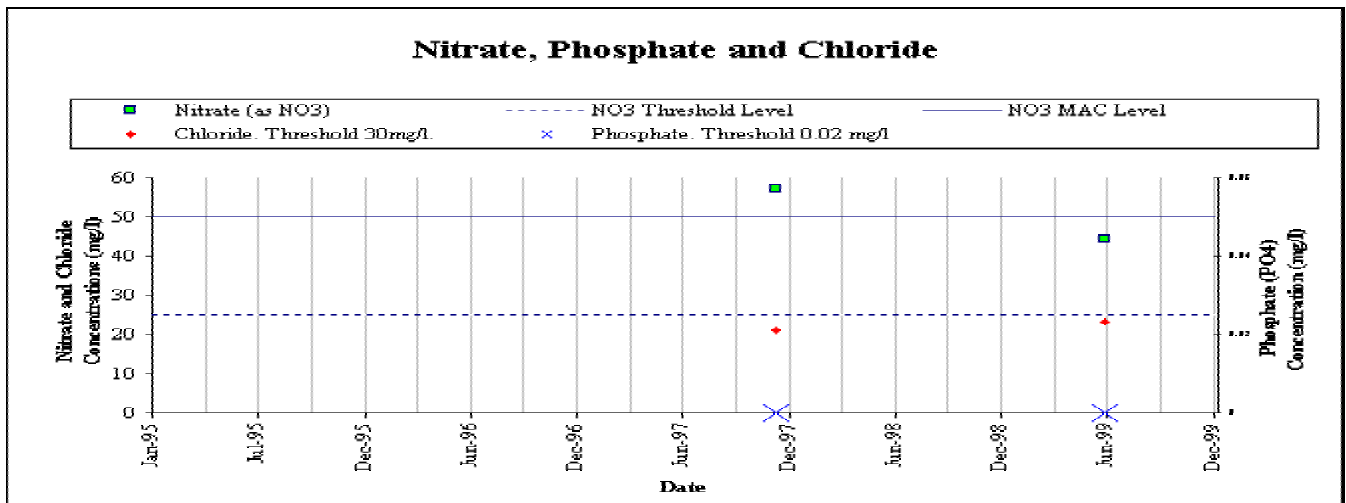


Figure 26-Fermoyle, Durrow
Key indicators of agricultural and Domestic Groundwater Contamination

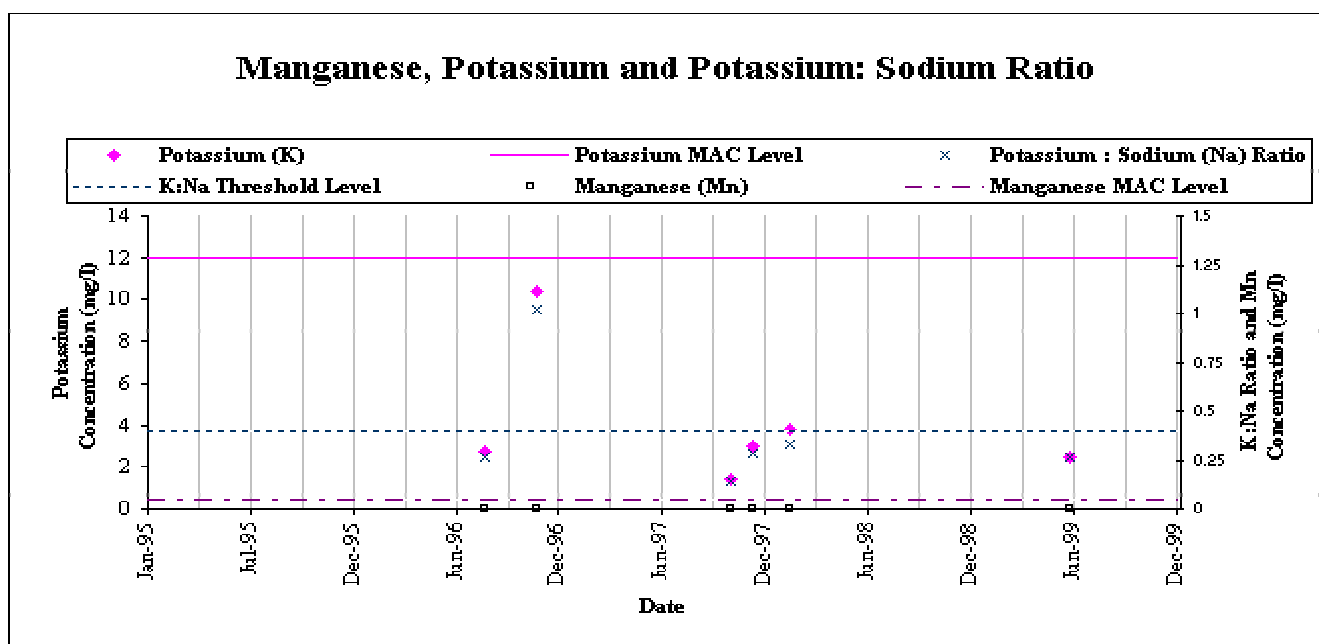
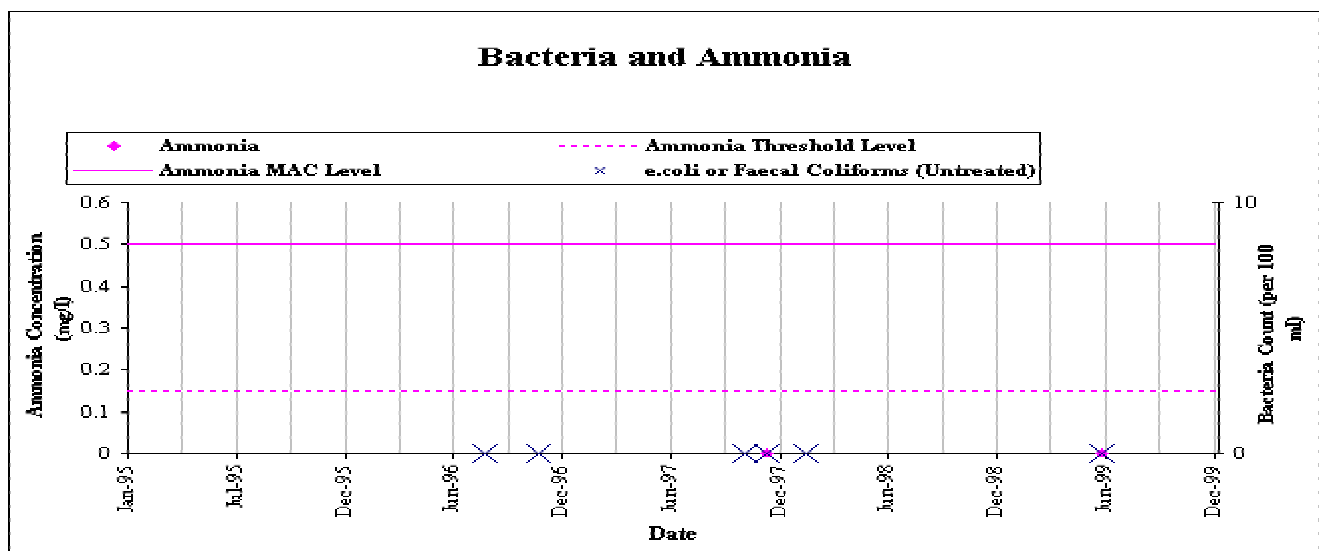
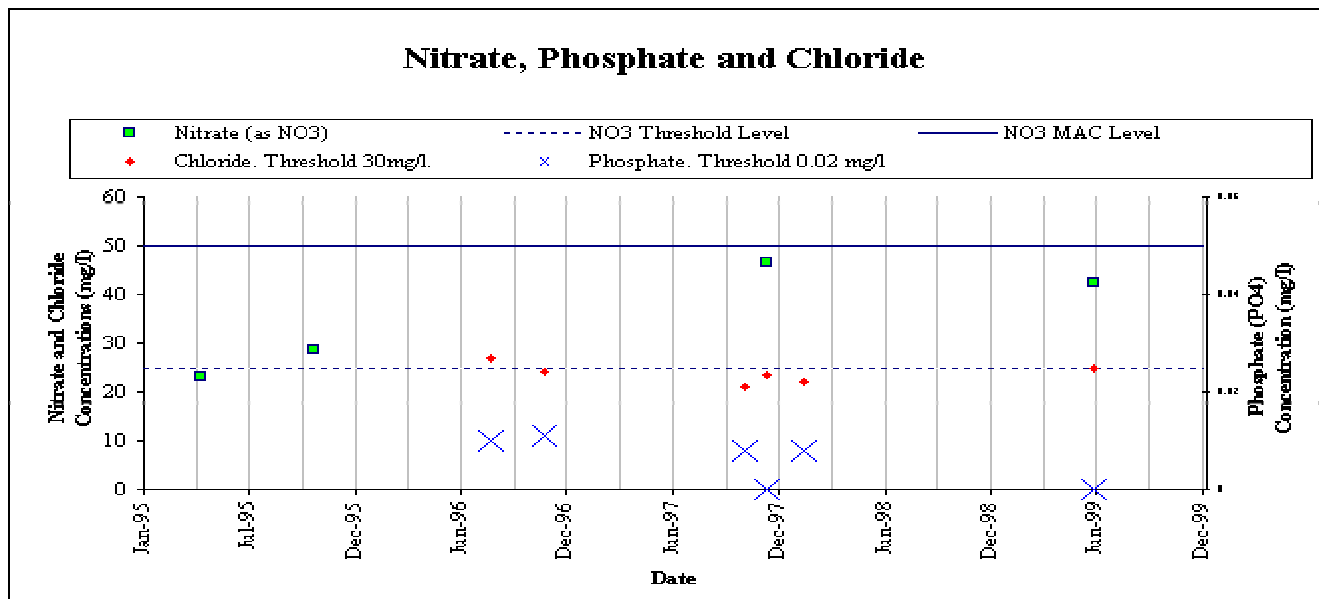
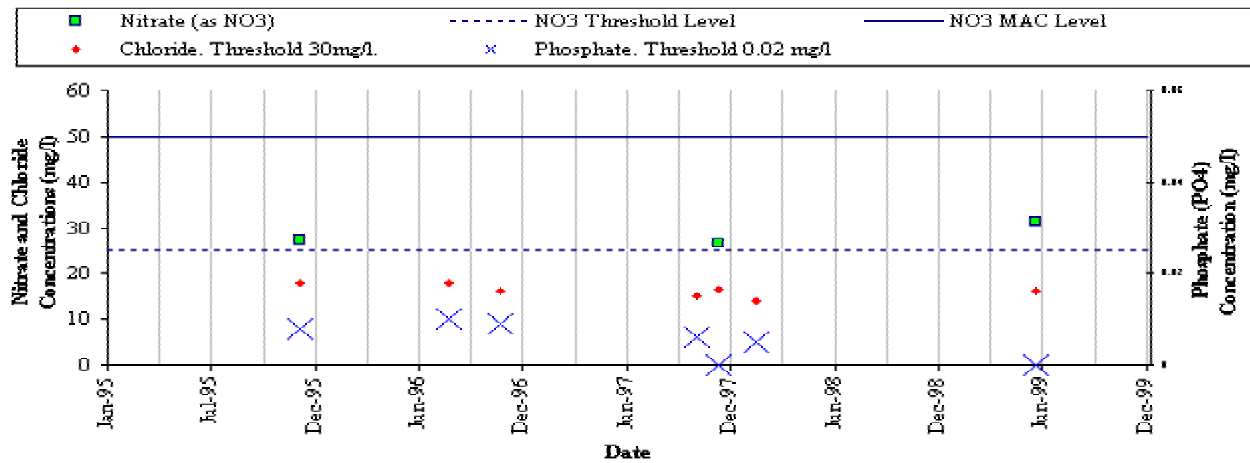
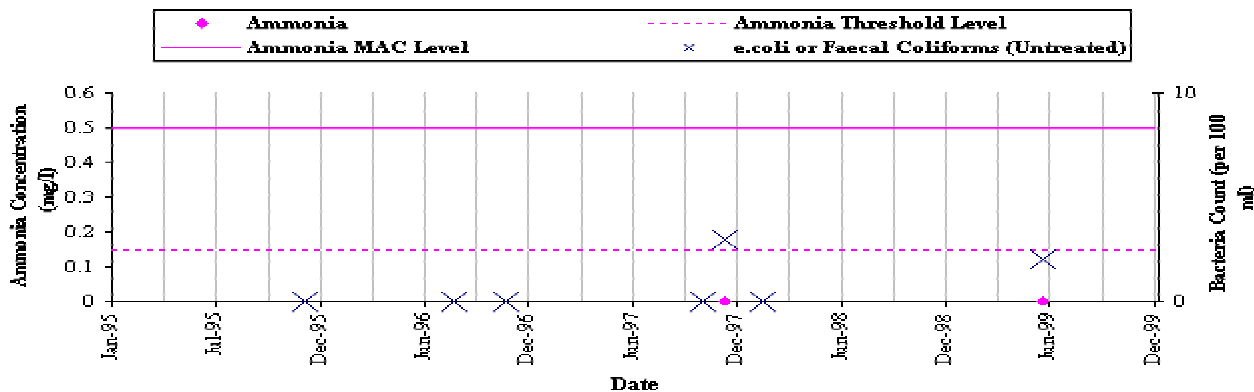


Figure 27-Five Wells, Abbeyleix
Key indicators of agricultural and Domestic Groundwater Contamination

Nitrate, Phosphate and Chloride



Bacteria and Ammonia



Manganese, Potassium and Potassium: Sodium Ratio

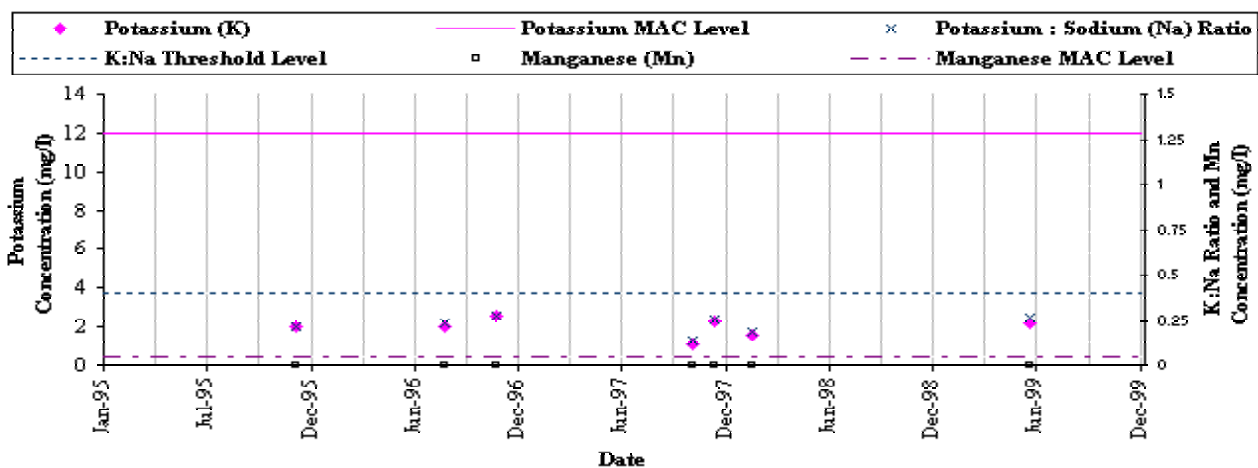


Figure 28-Killeaney GWS
Key indicators of agricultural and Domestic Groundwater Contamination

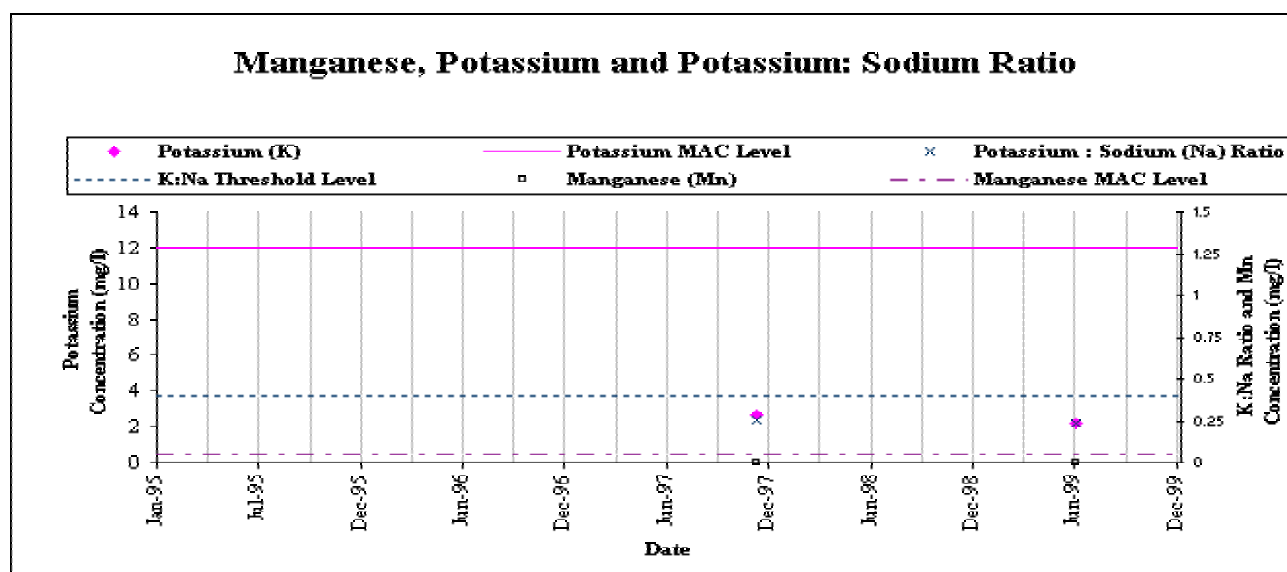
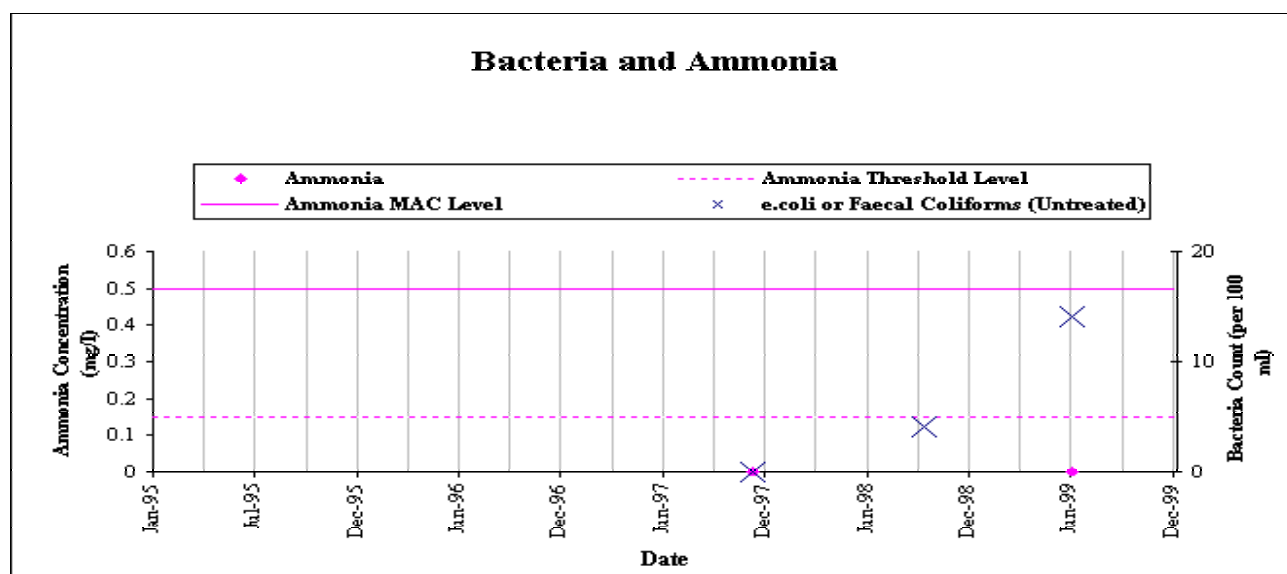
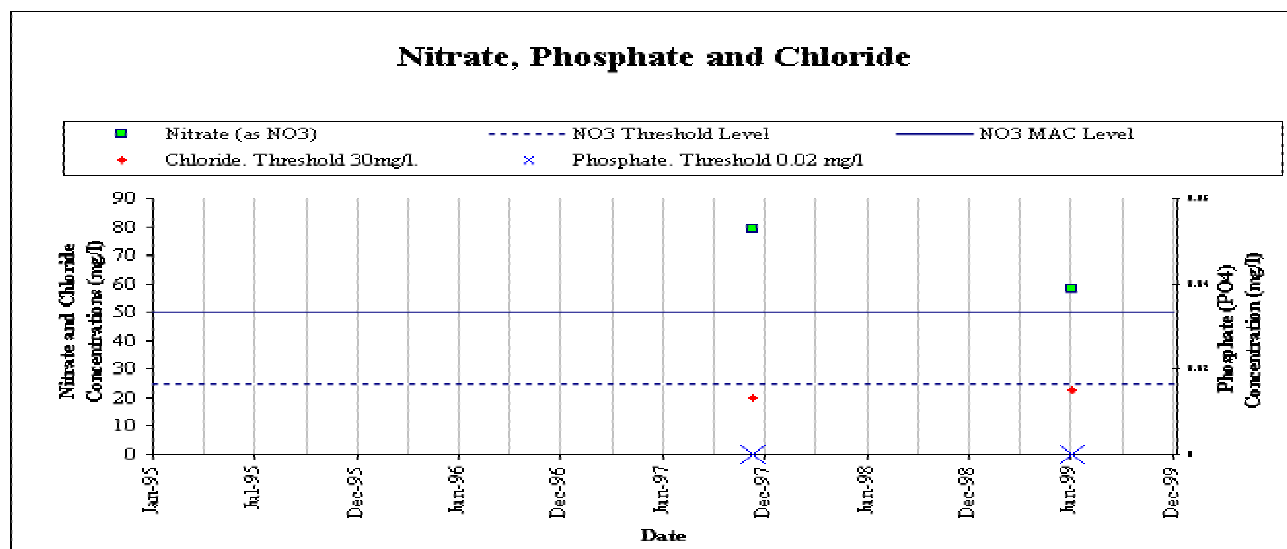


Figure 29-Killenard GWS
Key indicators of agricultural and Domestic Groundwater Contamination

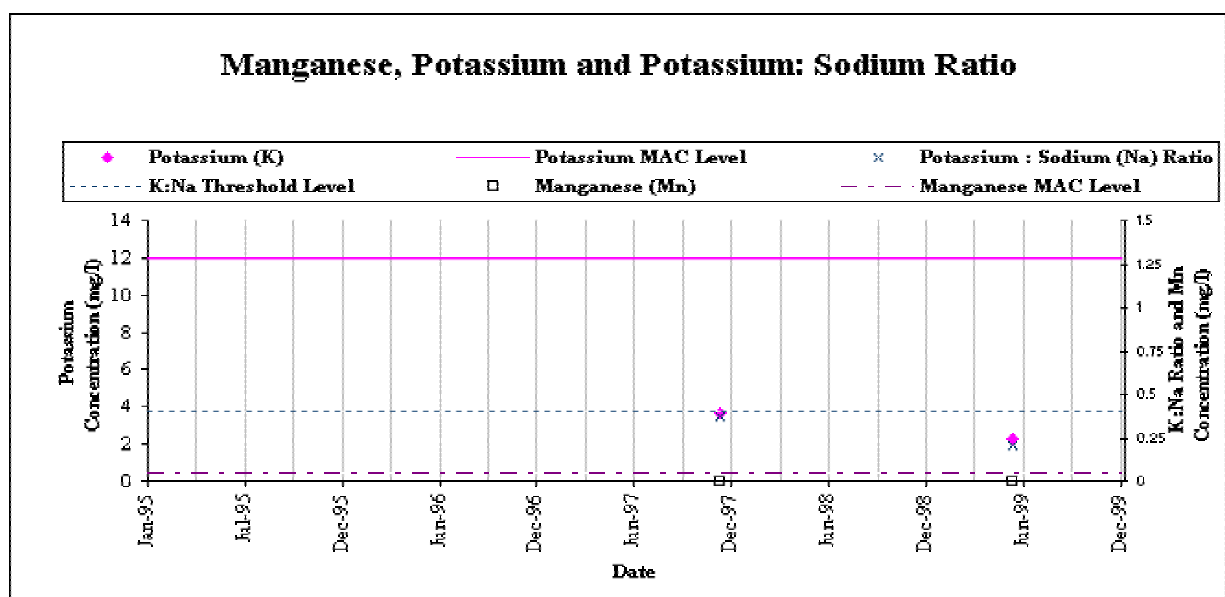
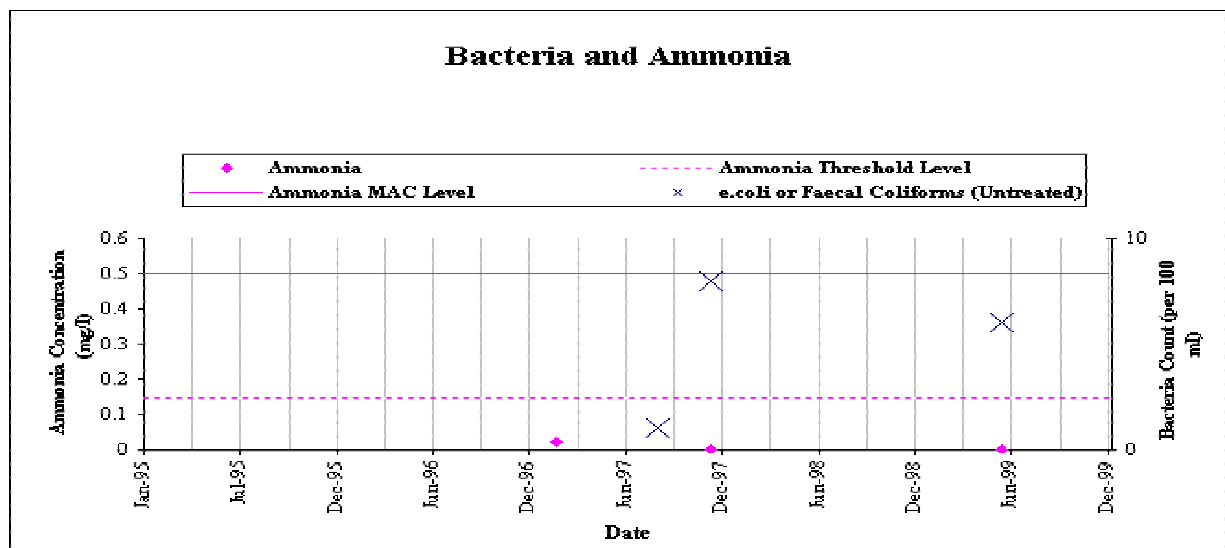
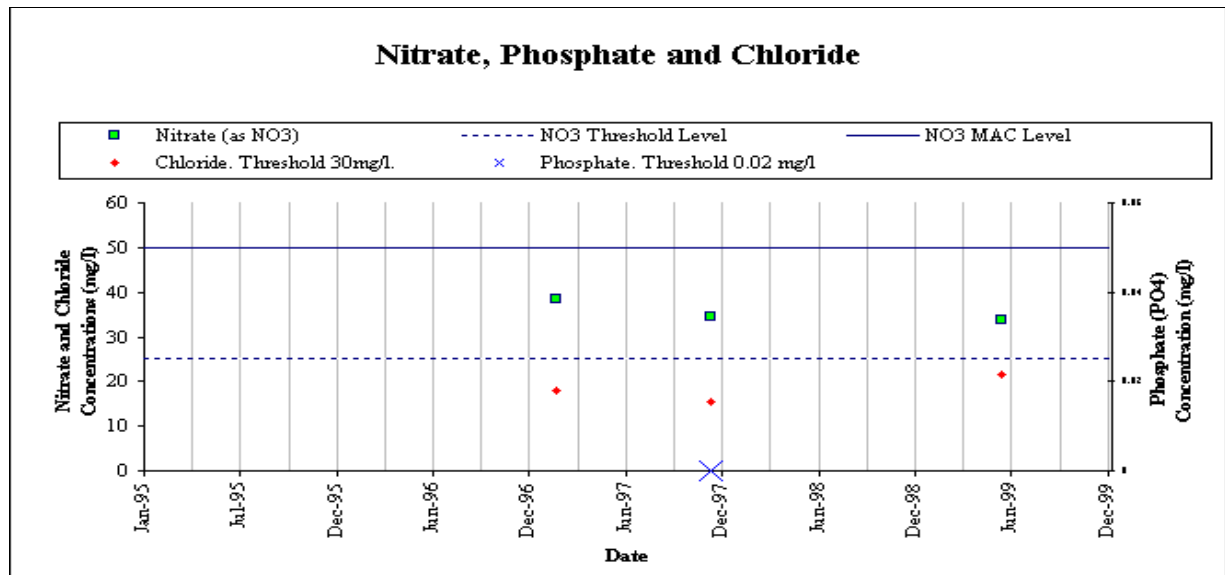


Figure 30-Knocks Bore, M'rath
Key indicators of agricultural and Domestic Groundwater Contamination

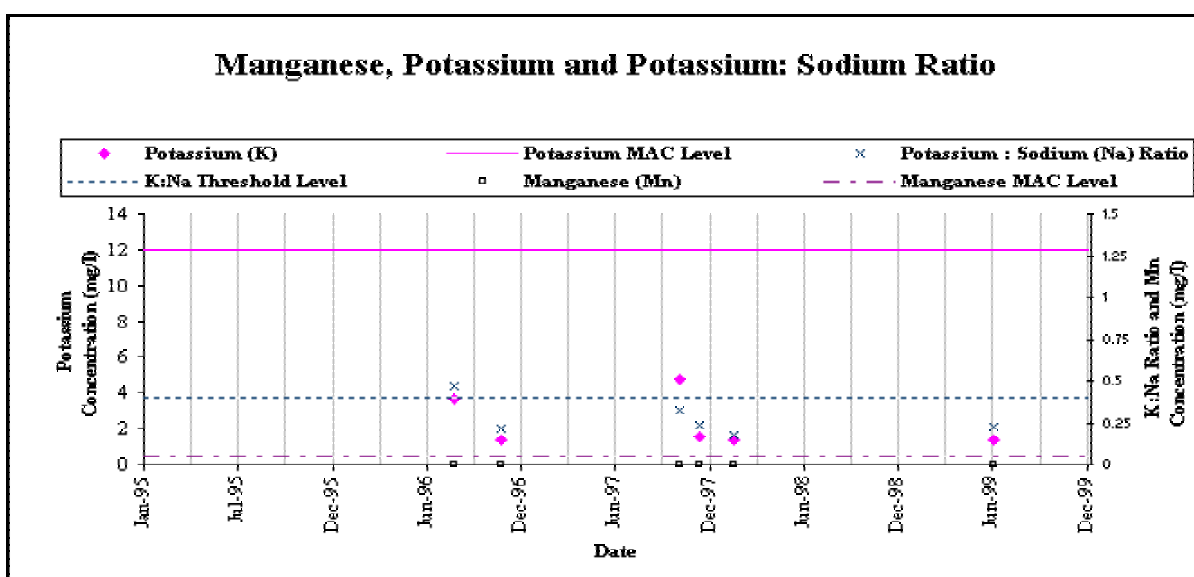
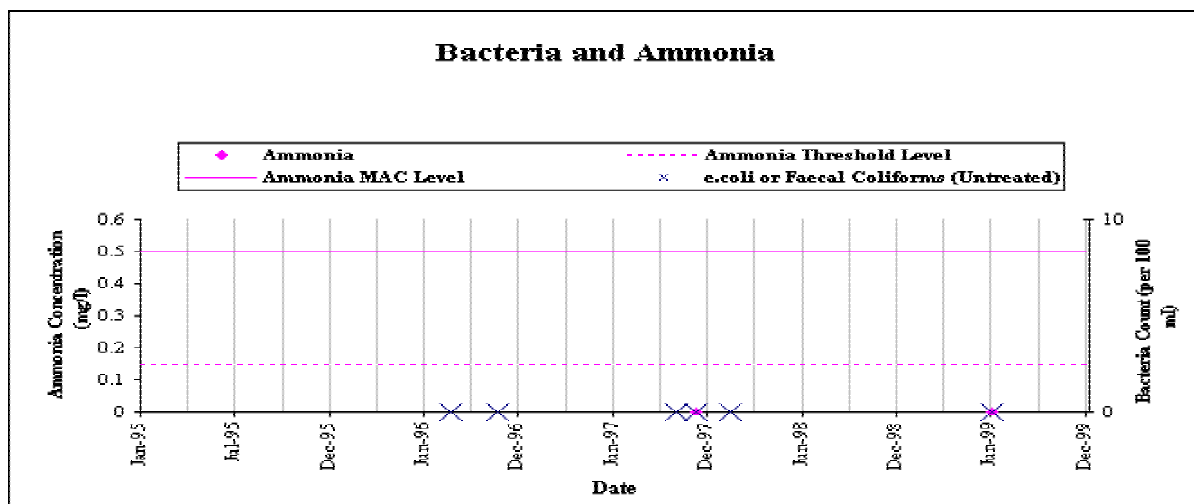
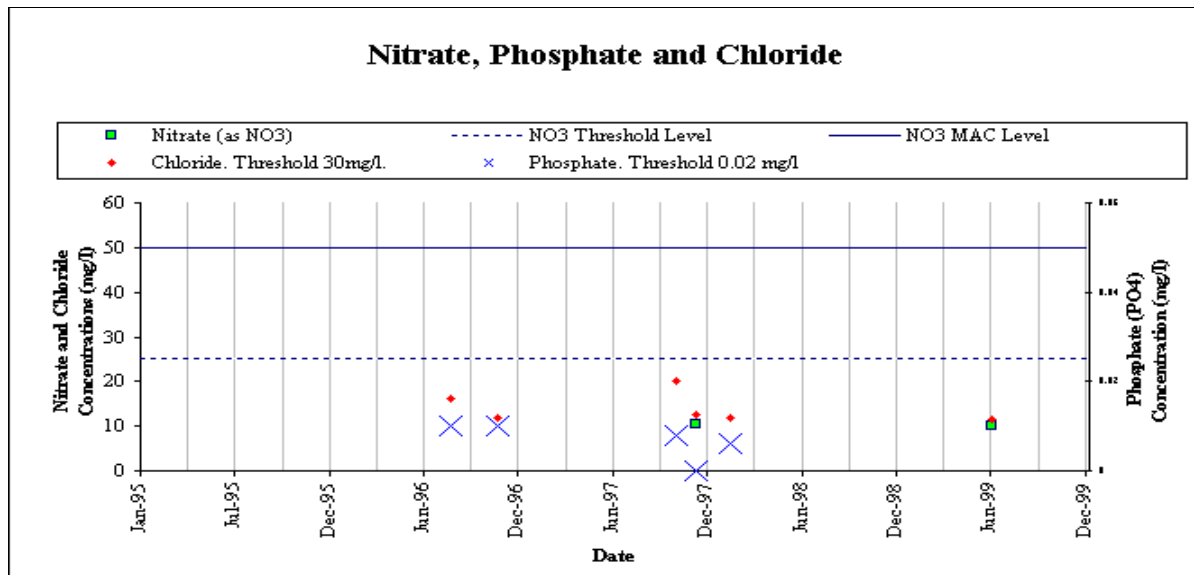


Figure 31-Knocks Spring, M'rath
Key indicators of agricultural and Domestic Groundwater Contamination

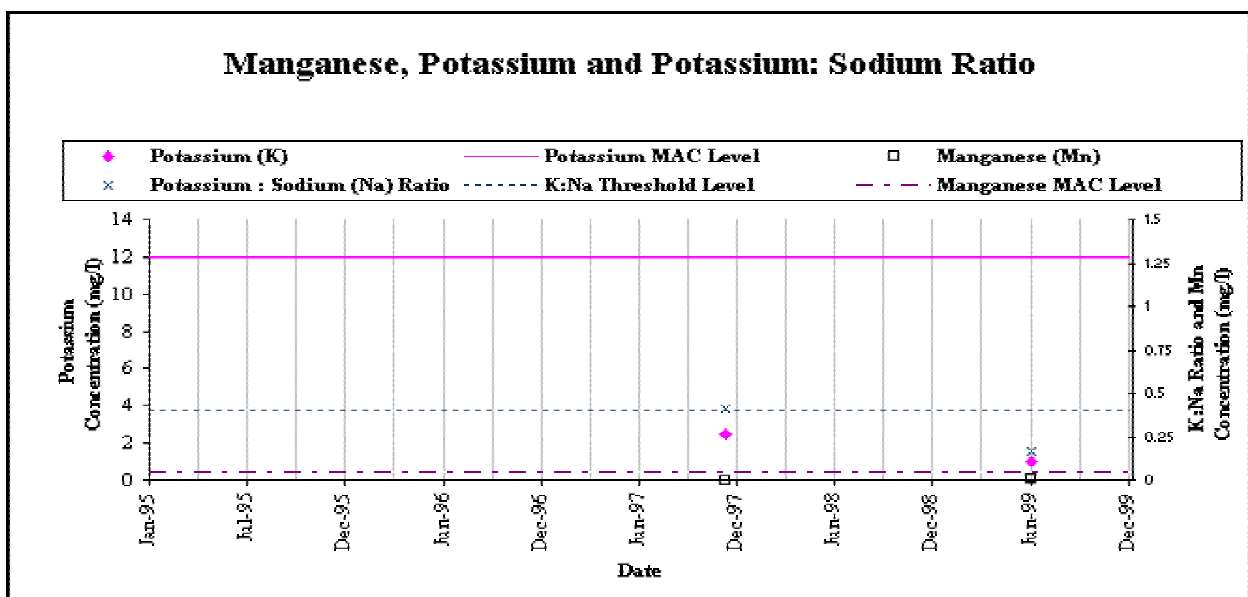
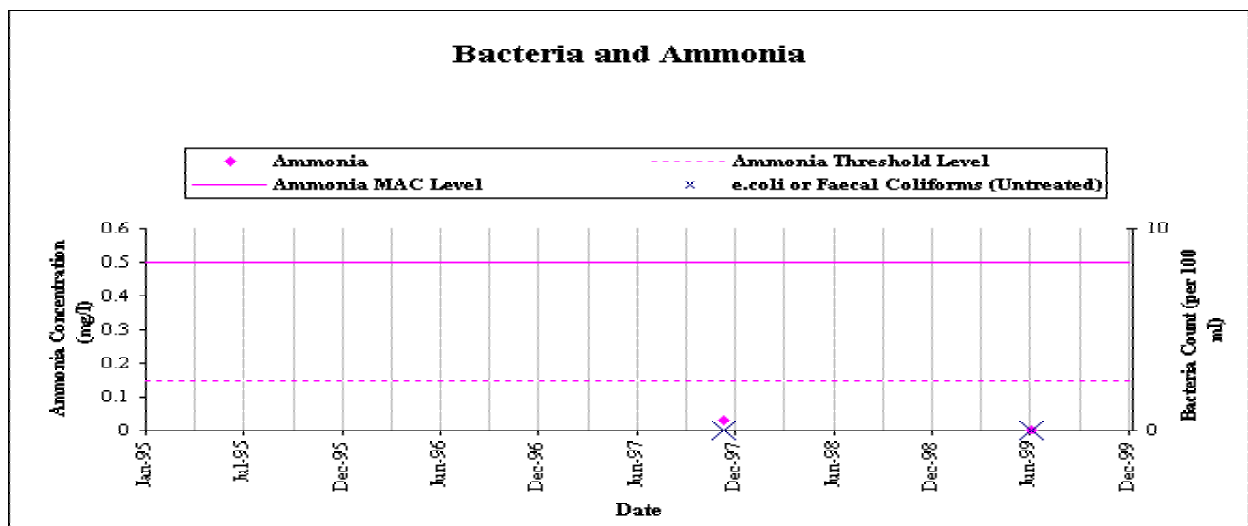
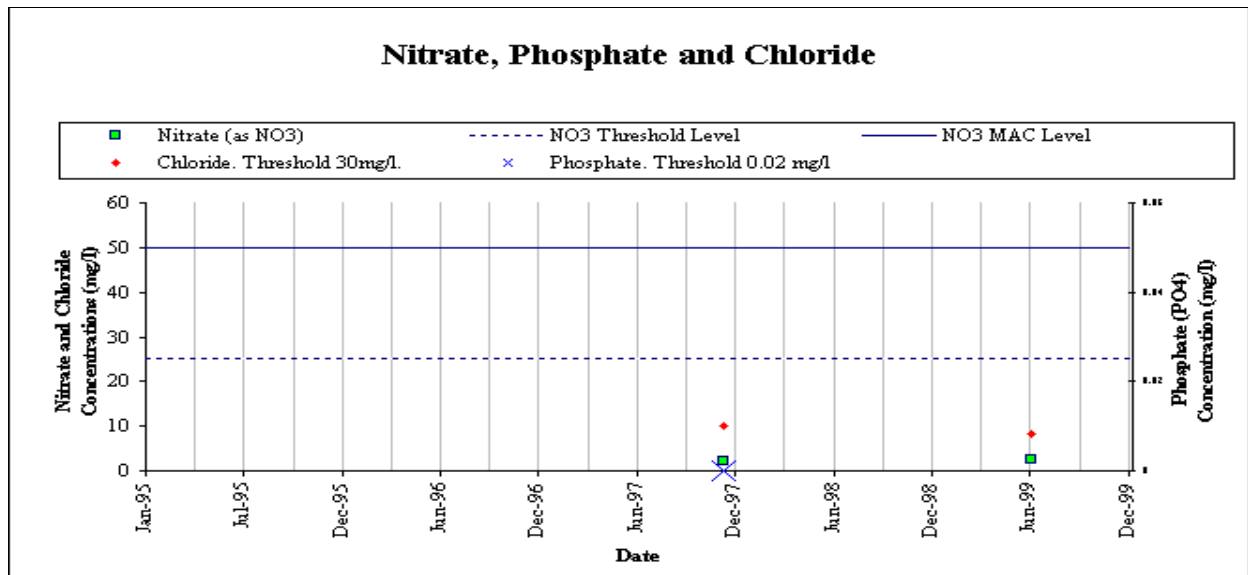


Figure 32-Kyle
Key indicators of agricultural and Domestic Groundwater Contamination

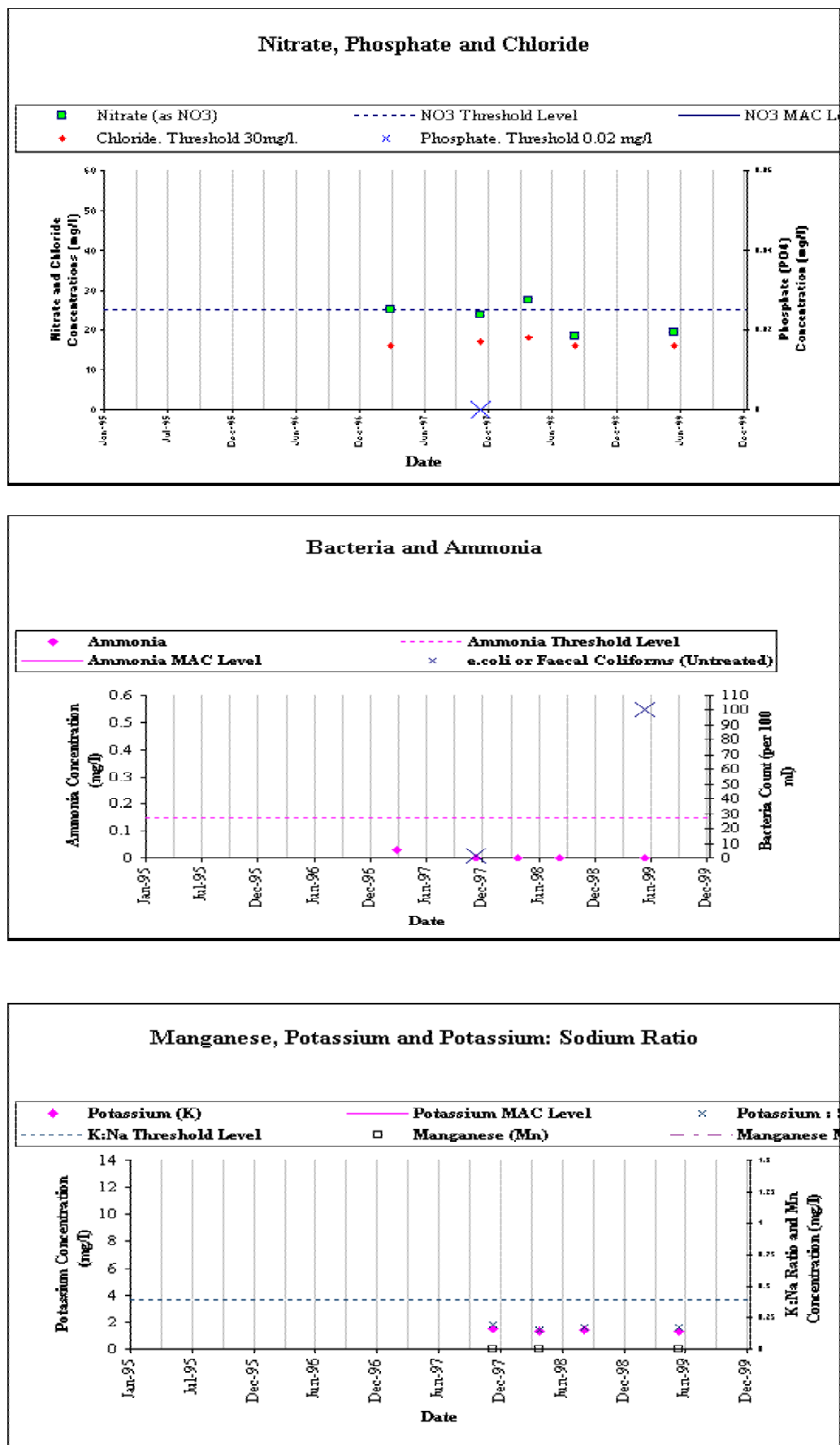


Figure 33- Lough, Ballybrittas
Key indicators of agricultural and Domestic Groundwater Contamination

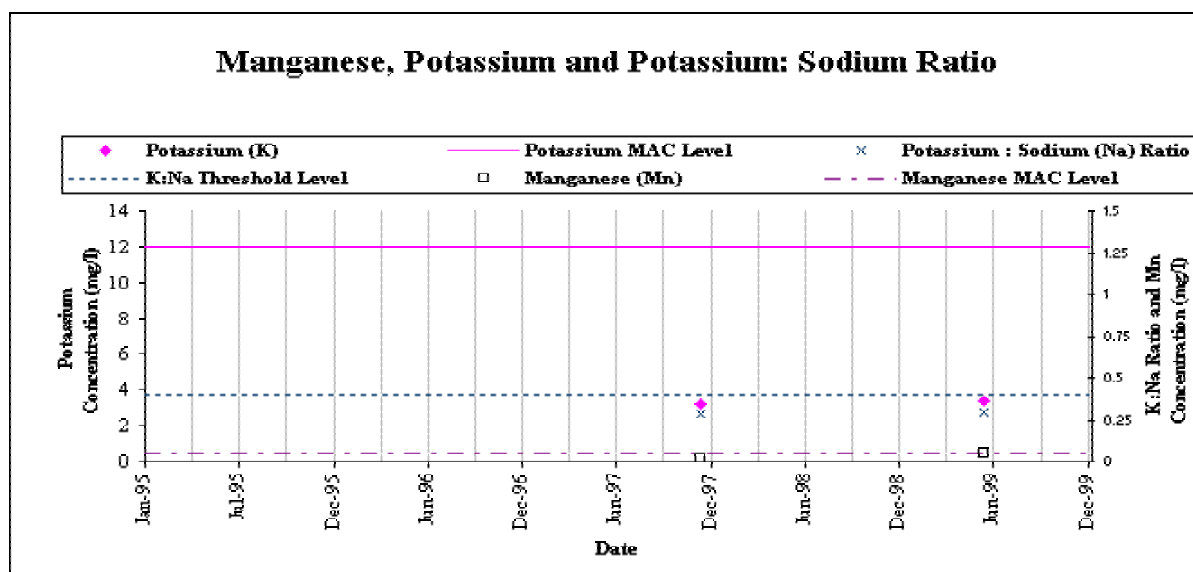
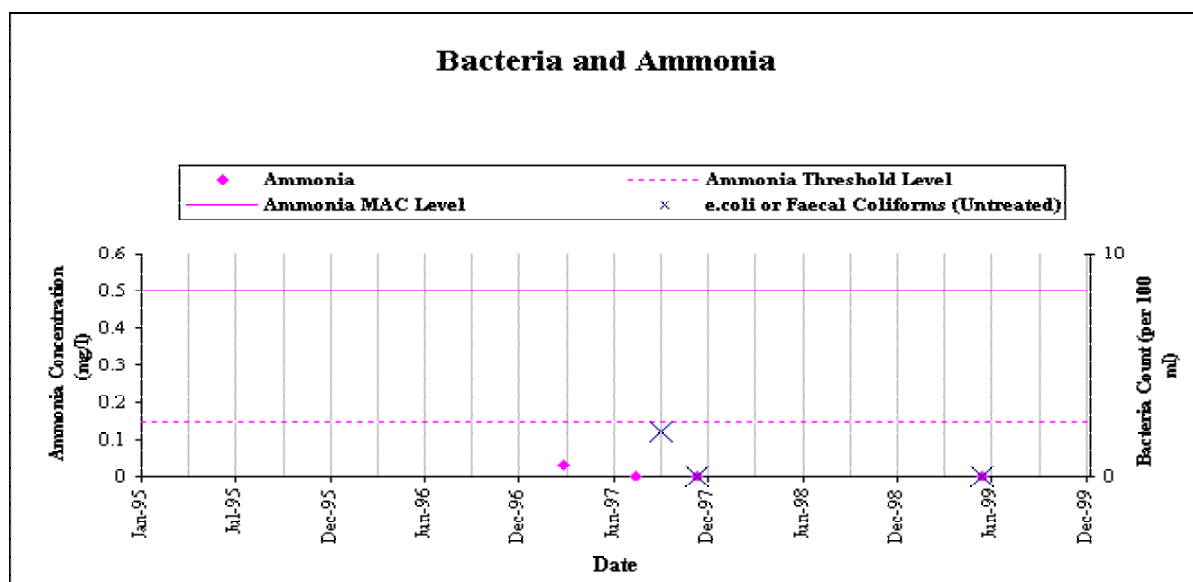
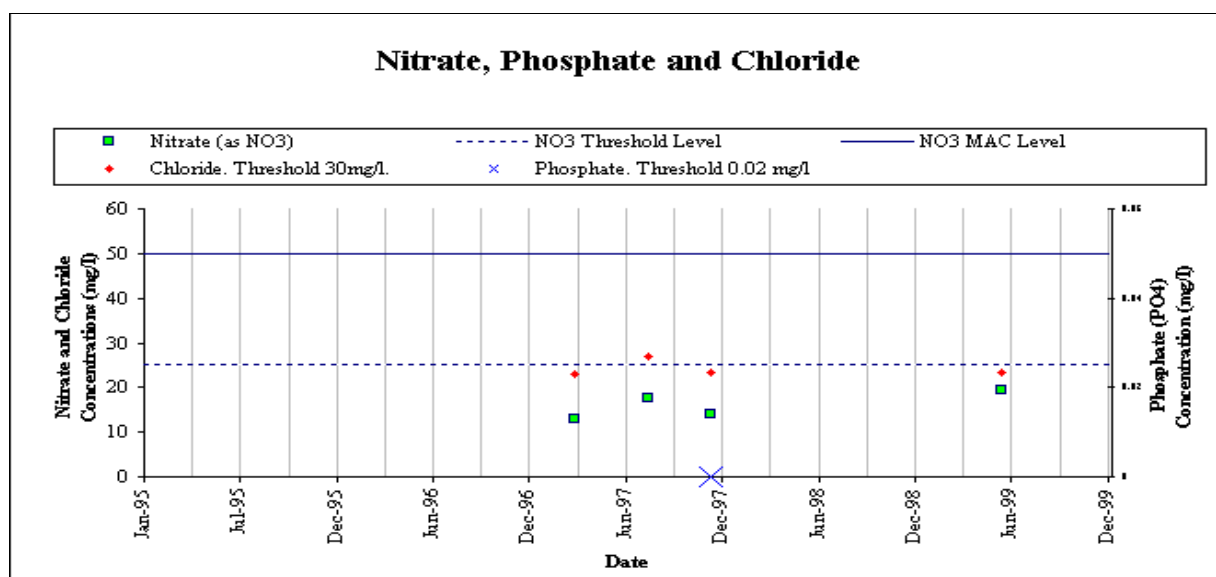


Figure 34-Lough, Potarlington
Key indicators of agricultural and Domestic Groundwater Contamination

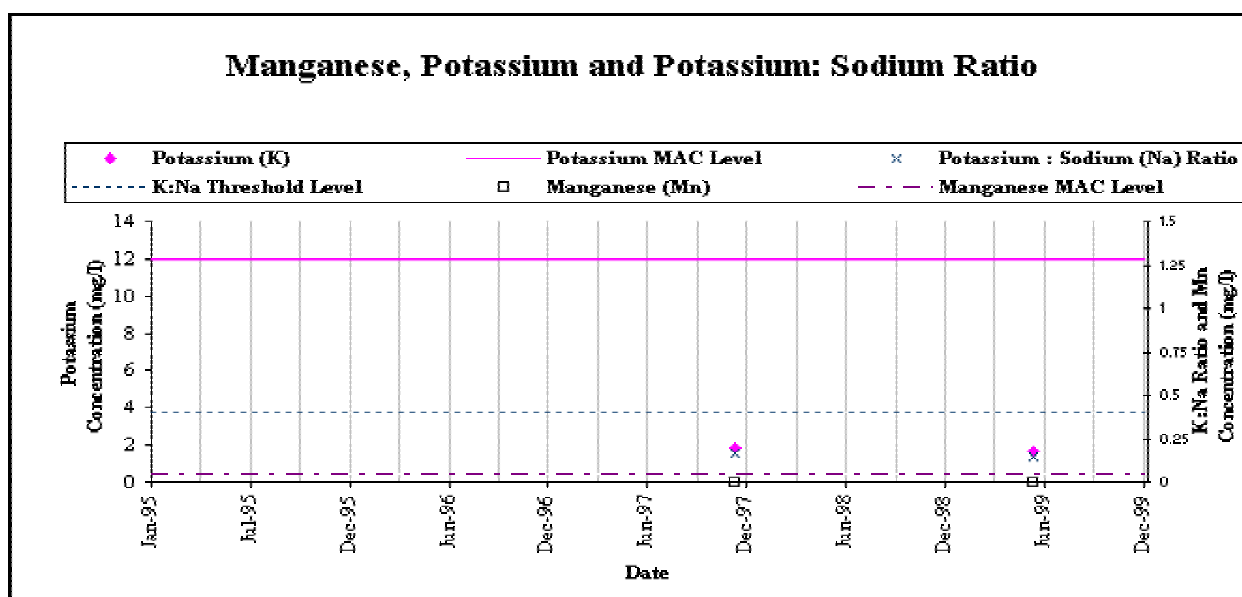
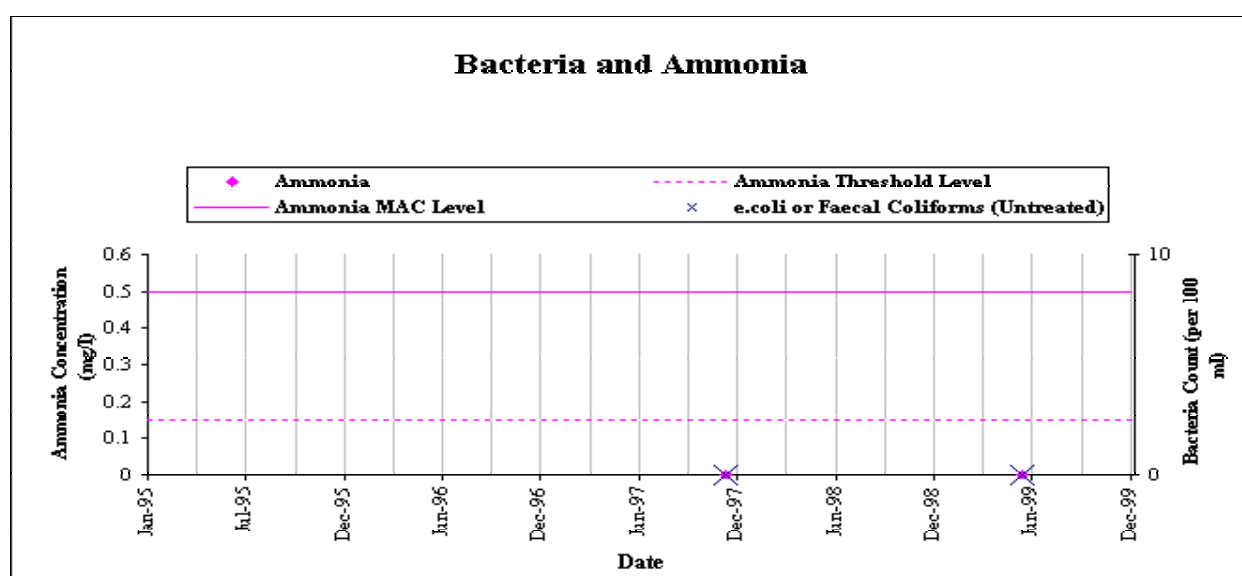
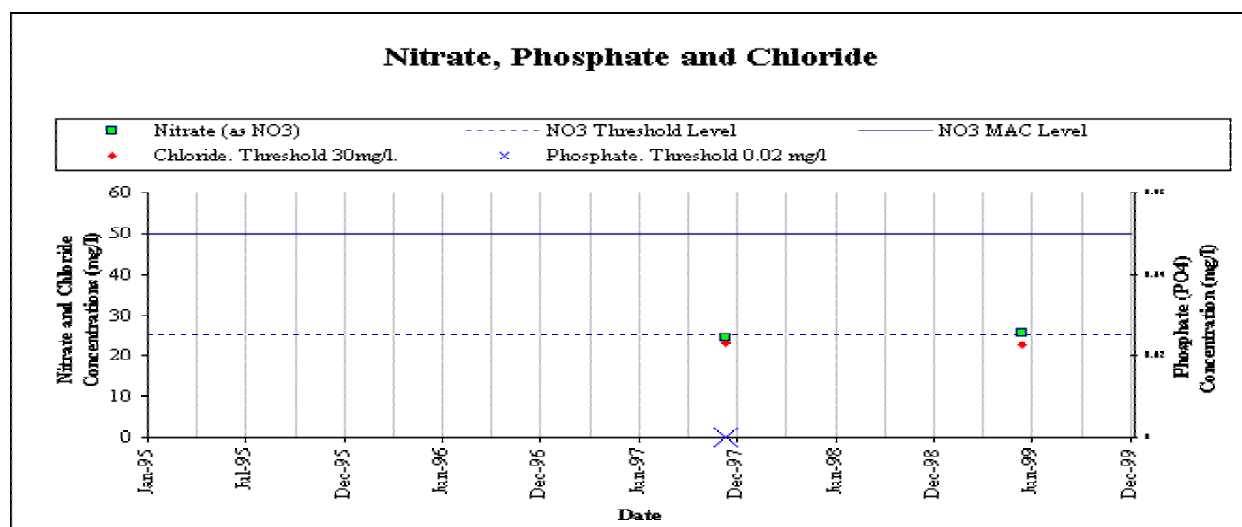


Figure 35-Max Well
Key indicators of agricultural and Domestic Groundwater Contamination

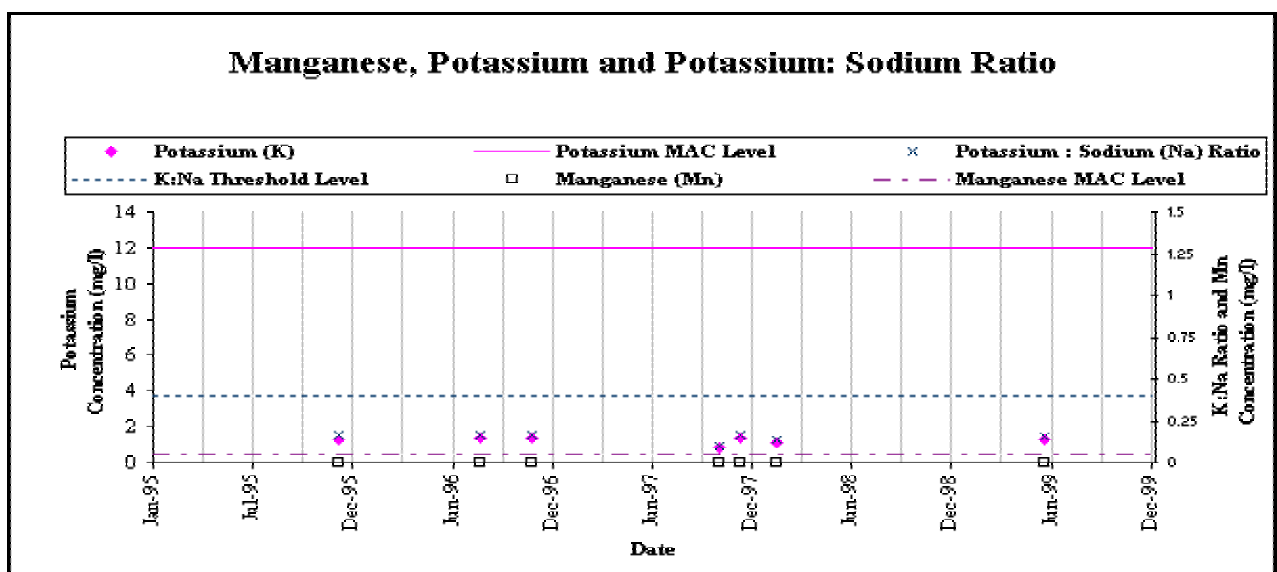
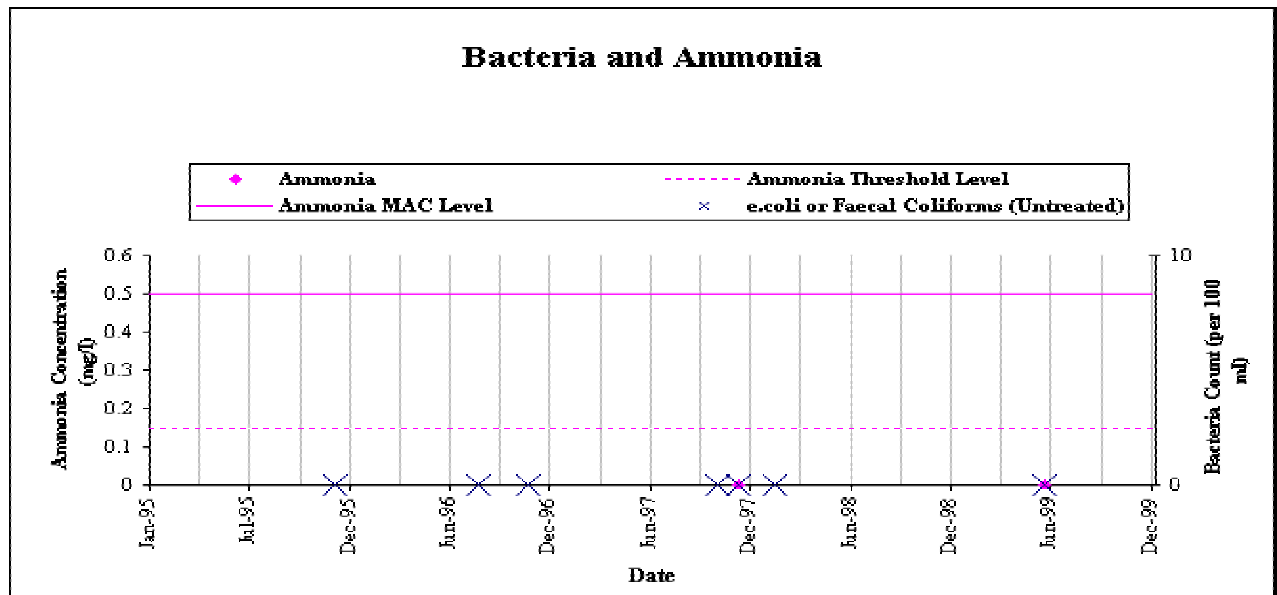
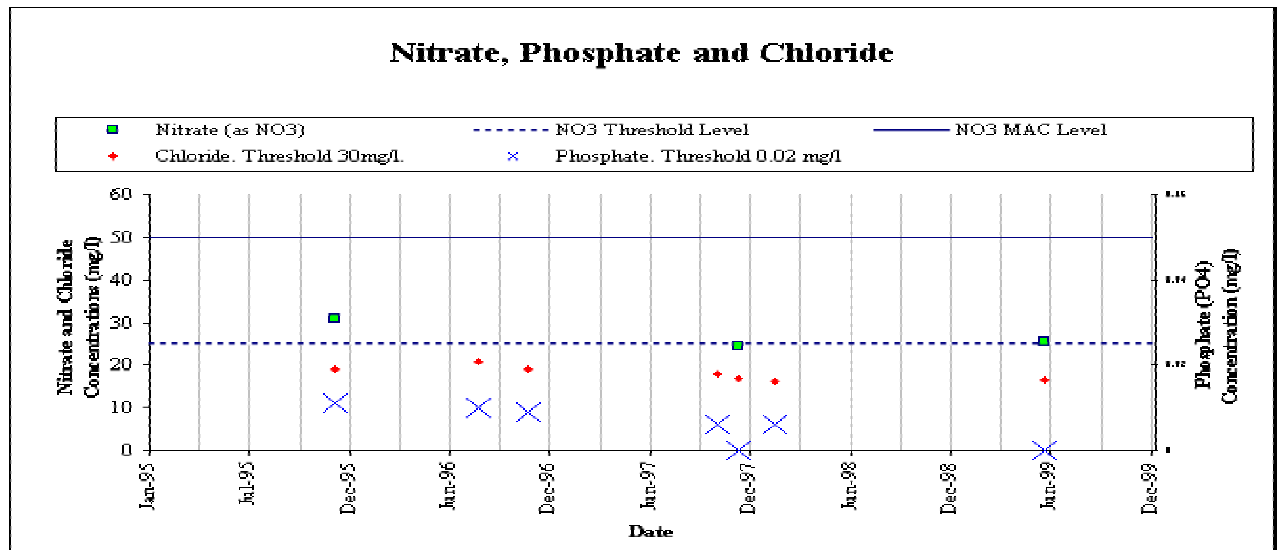


Figure 36-Meelick
Key indicators of agricultural and Domestic Groundwater Contamination

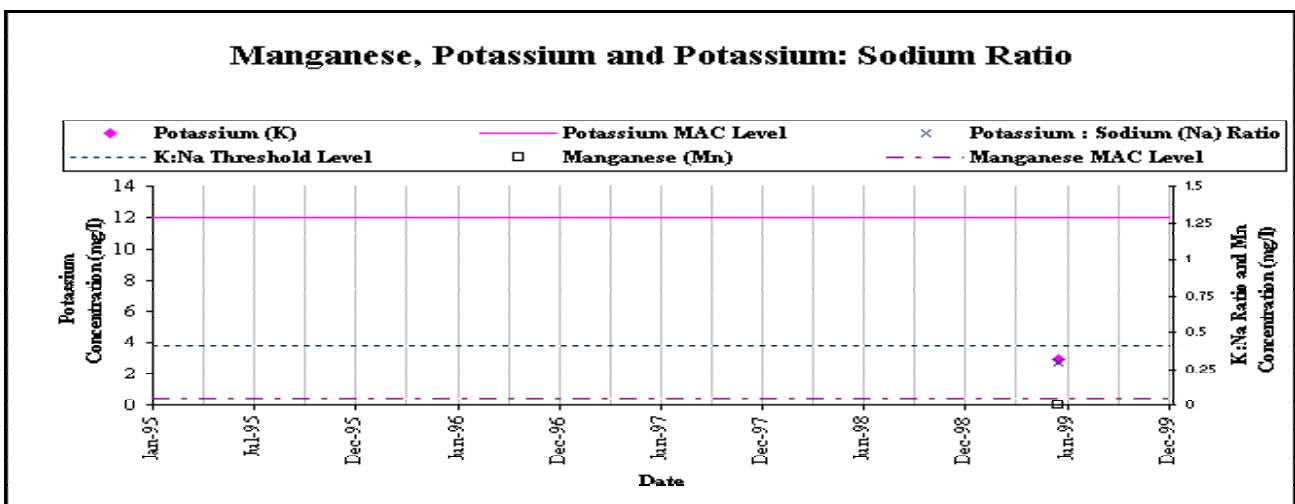
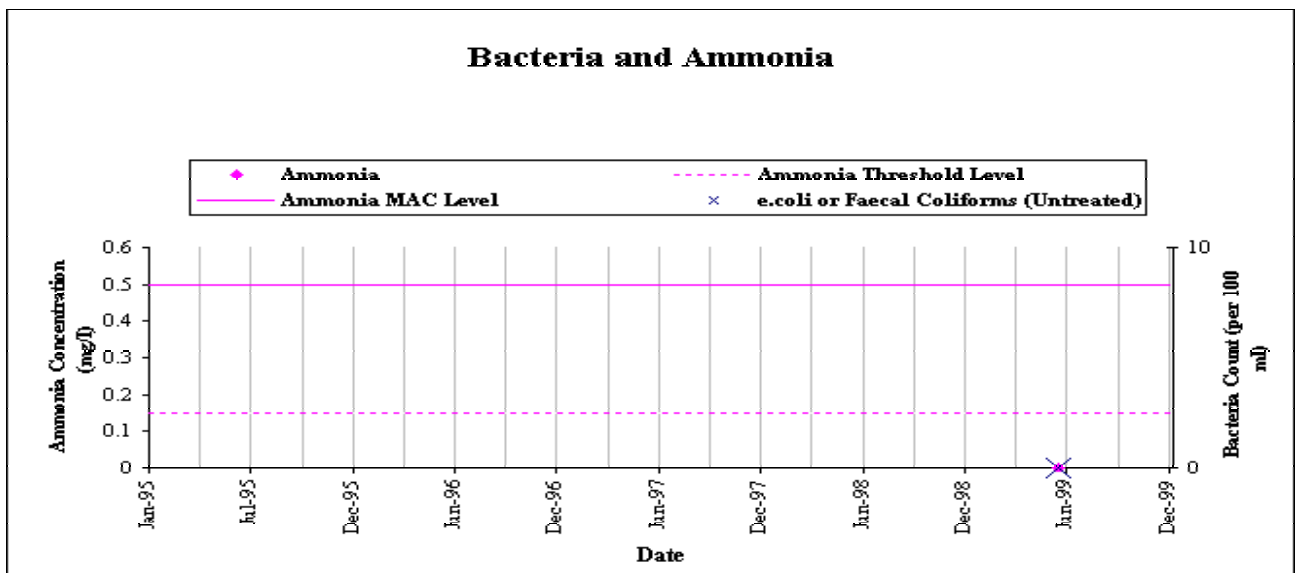
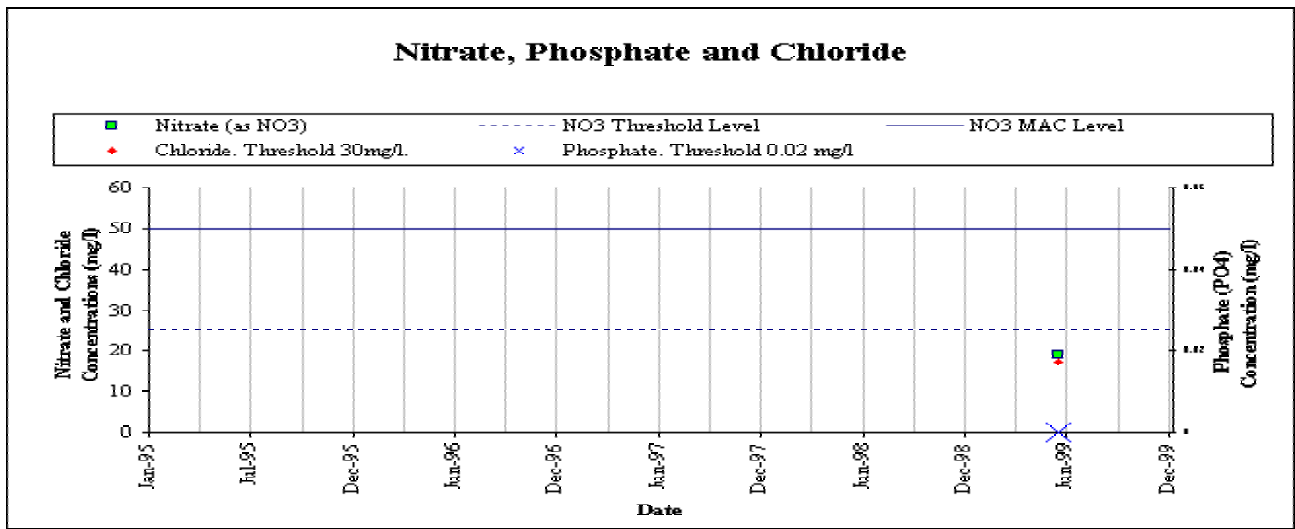


Figure 37-Mountsaalem GWS
Key indicators of agricultural and Domestic Groundwater Contamination

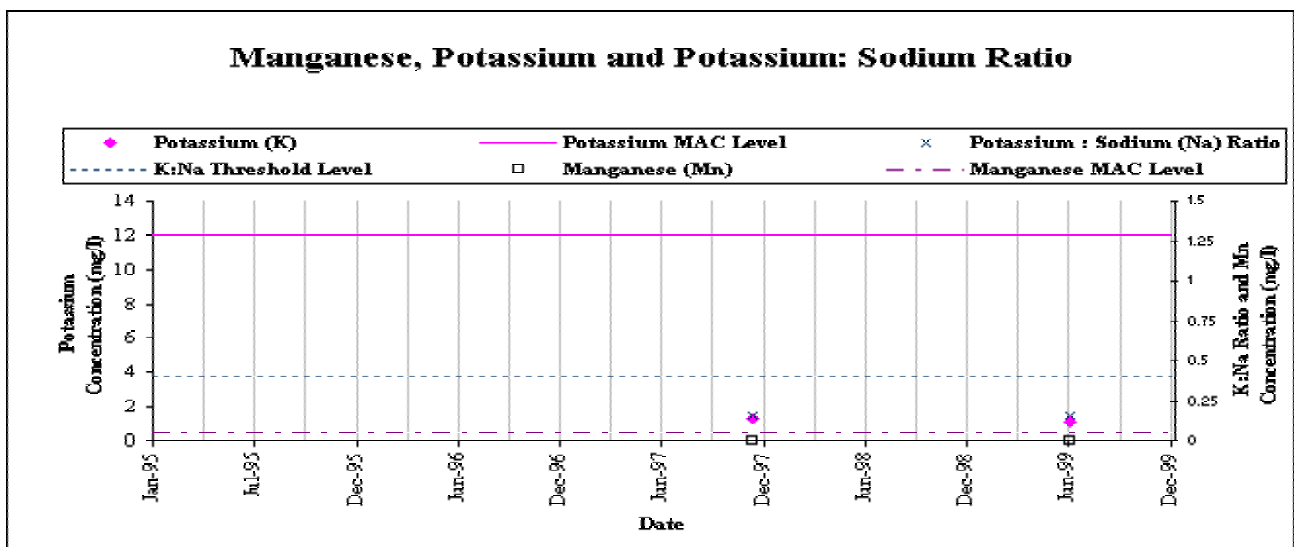
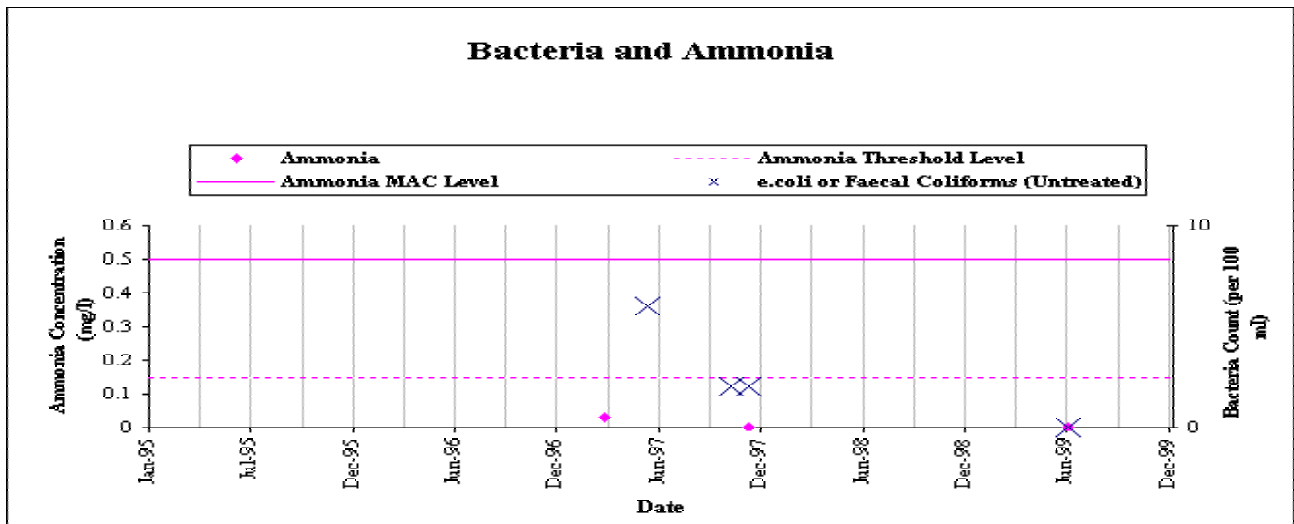
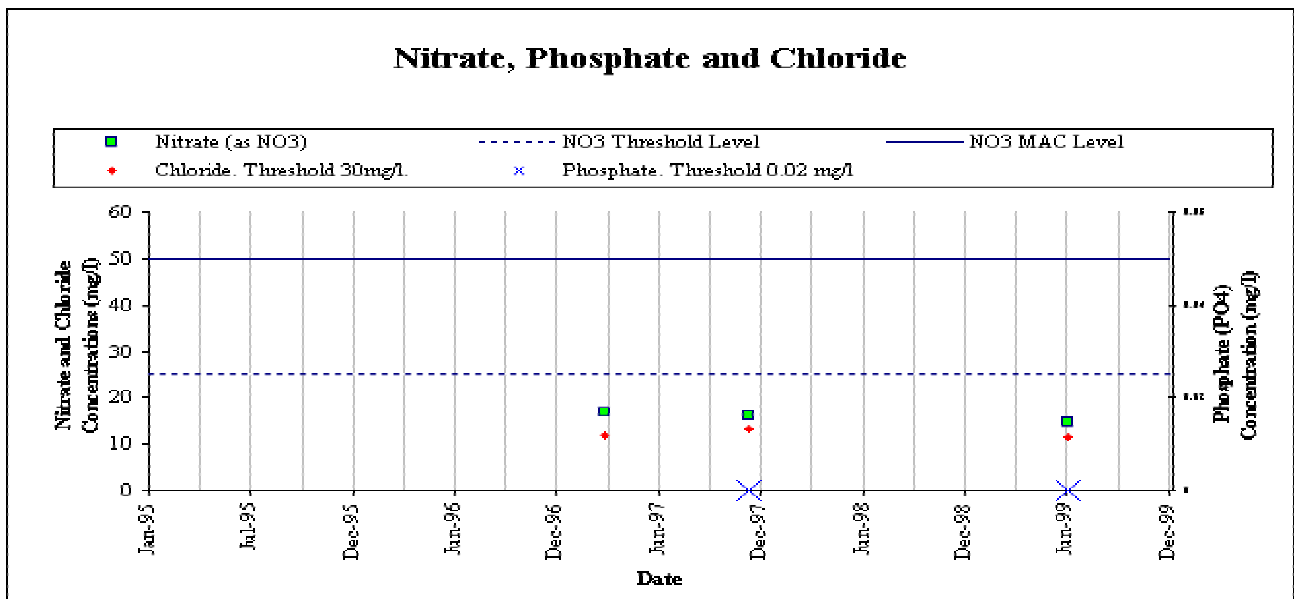


Figure 38-Ralish GWS
Key indicators of agricultural and Domestic Groundwater Contamination

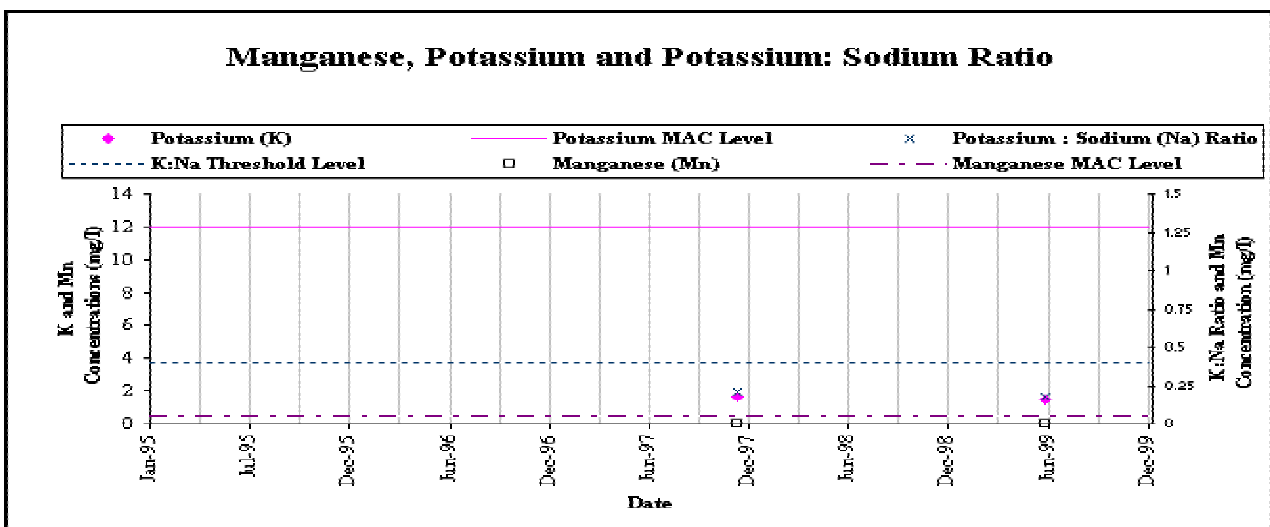
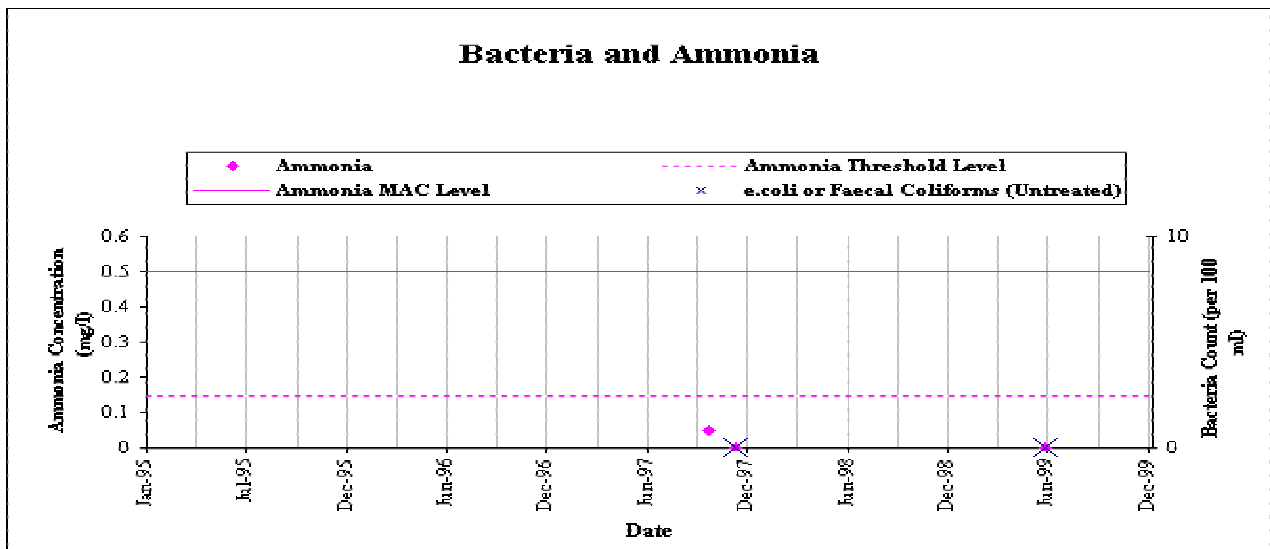
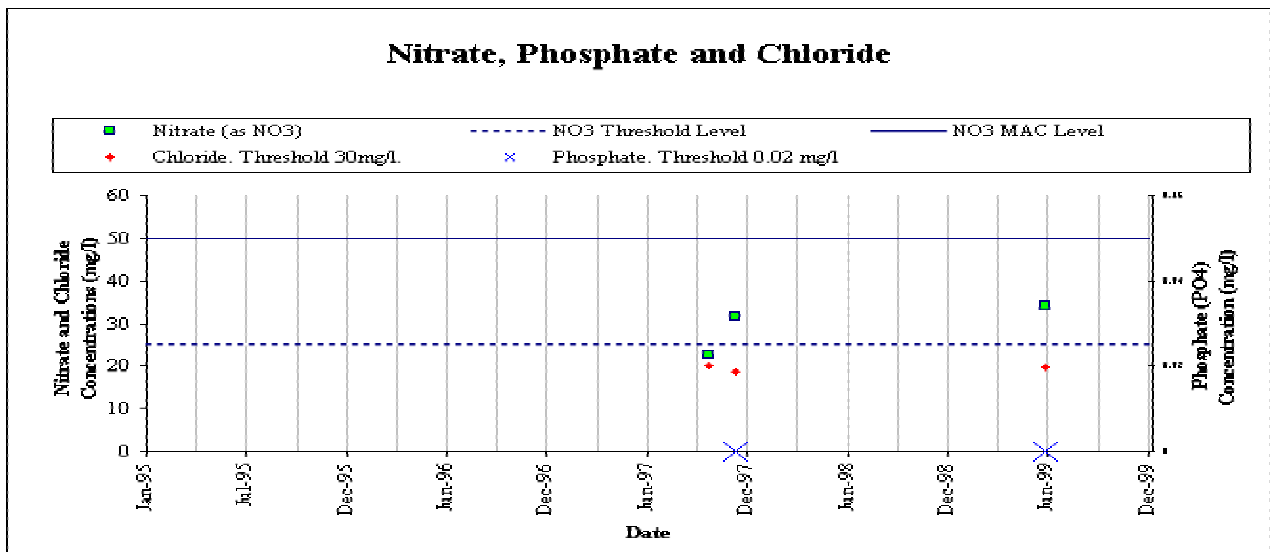


Figure 39-Rathdowney
Key indicators of agricultural and Domestic Groundwater Contamination

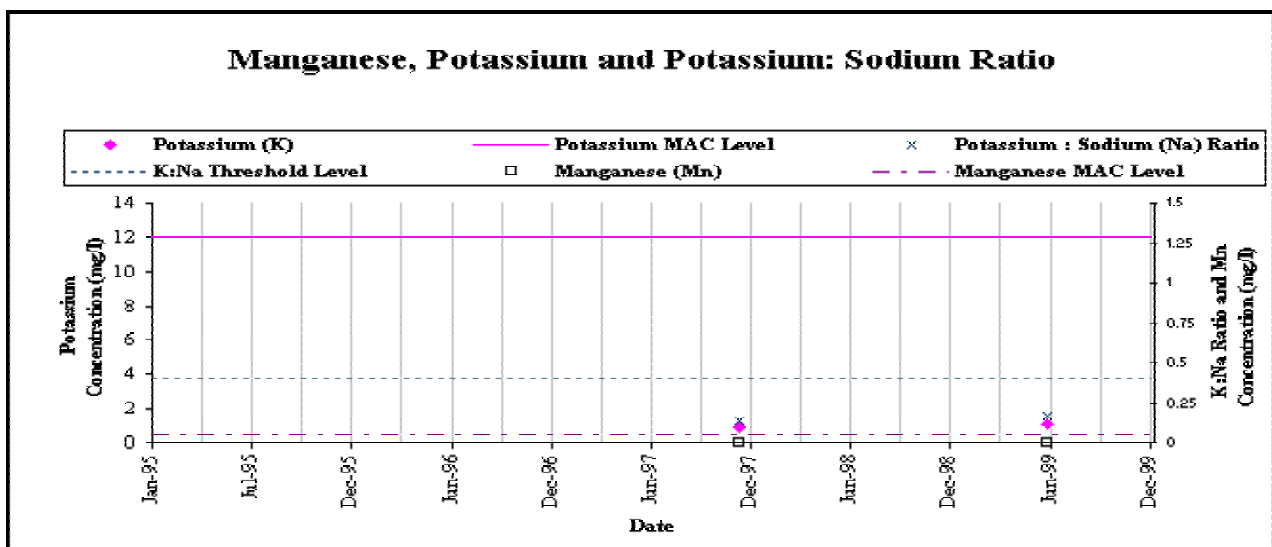
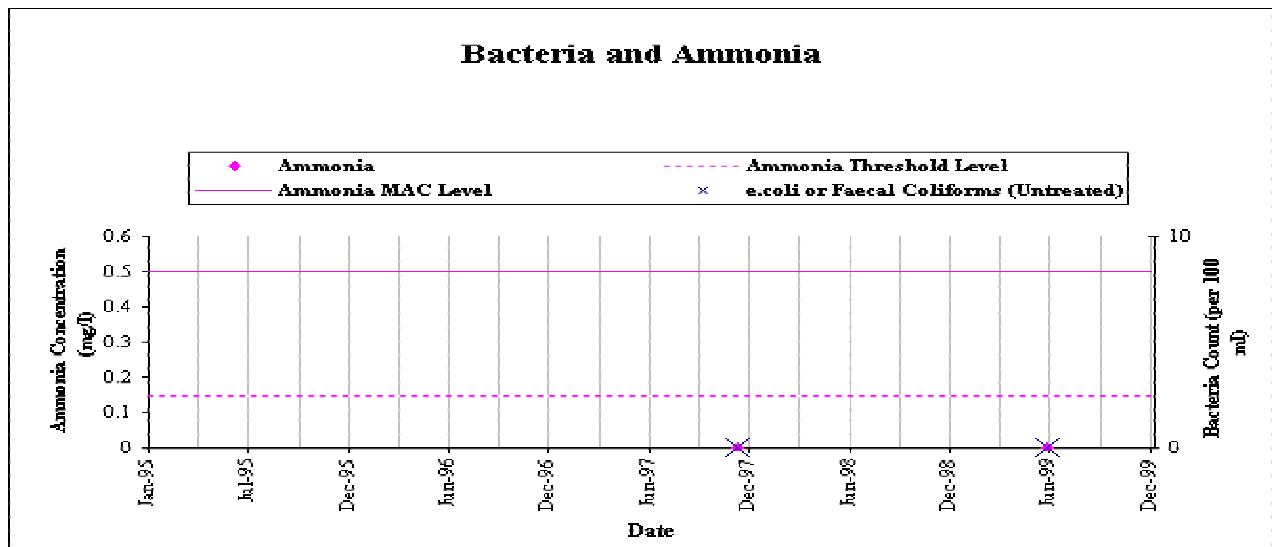
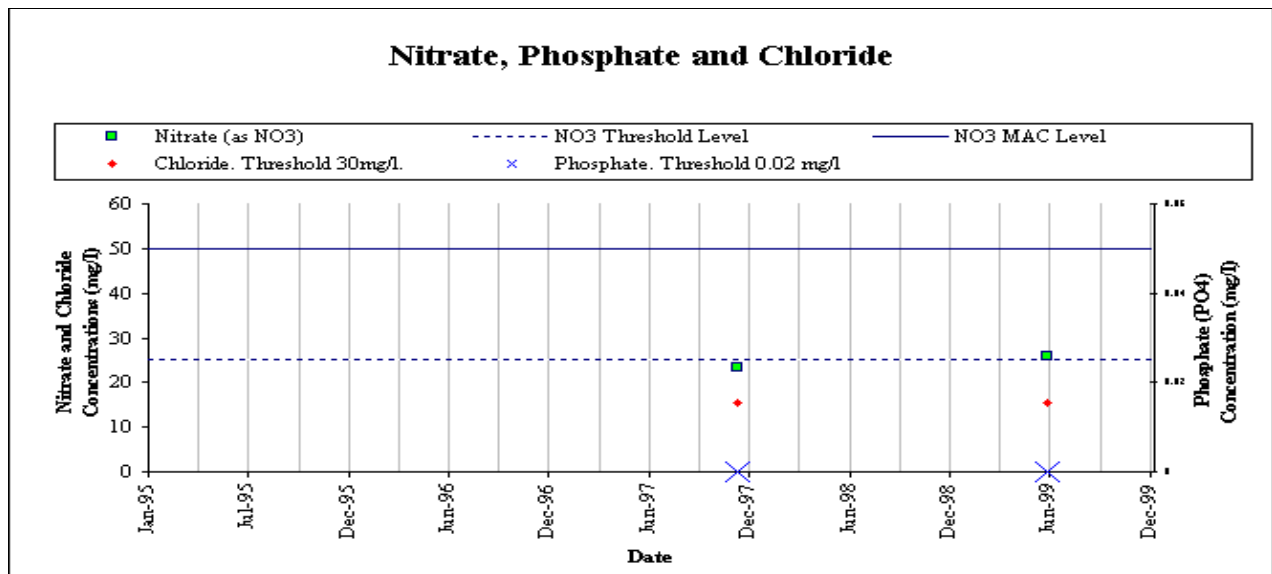


Figure 40-Rosenallis
Key indicators of agricultural and Domestic Groundwater Contamination

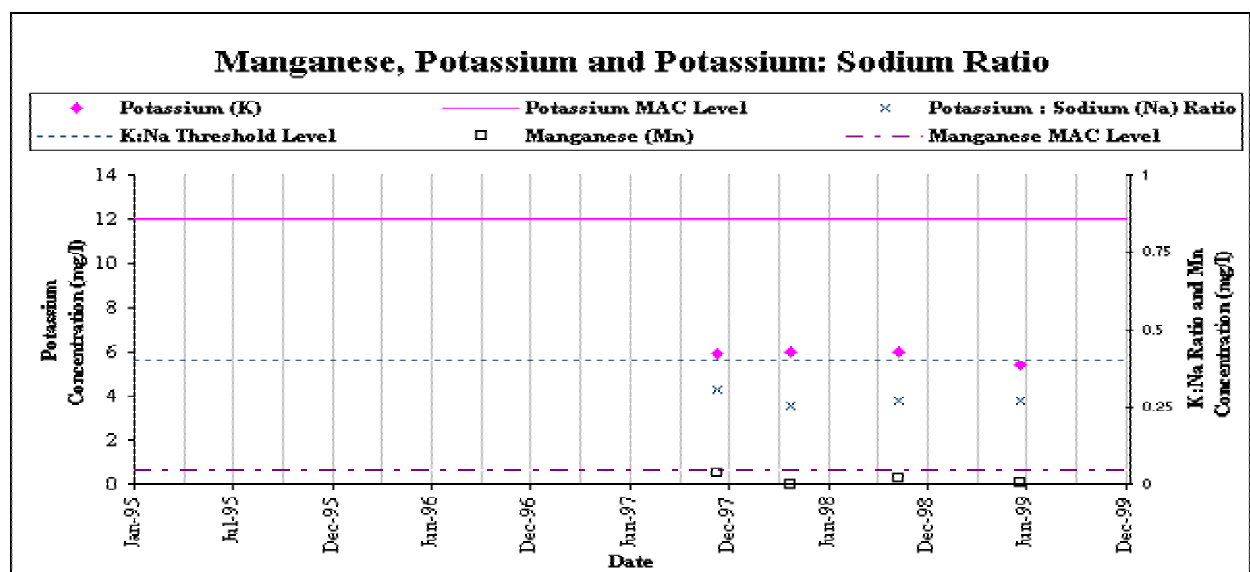
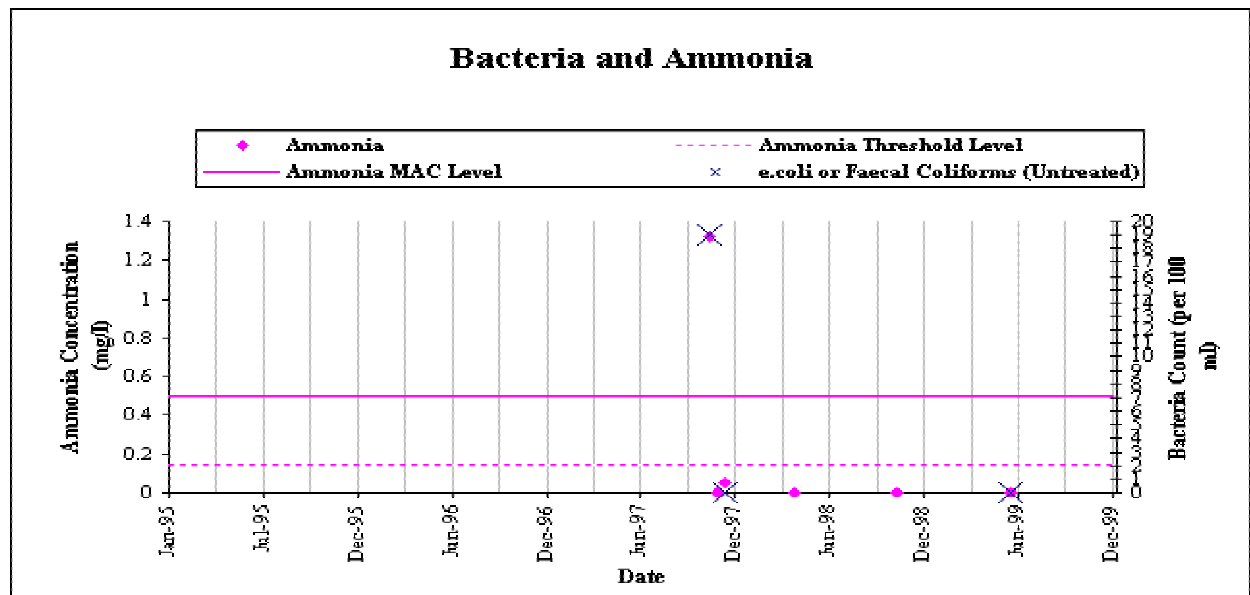
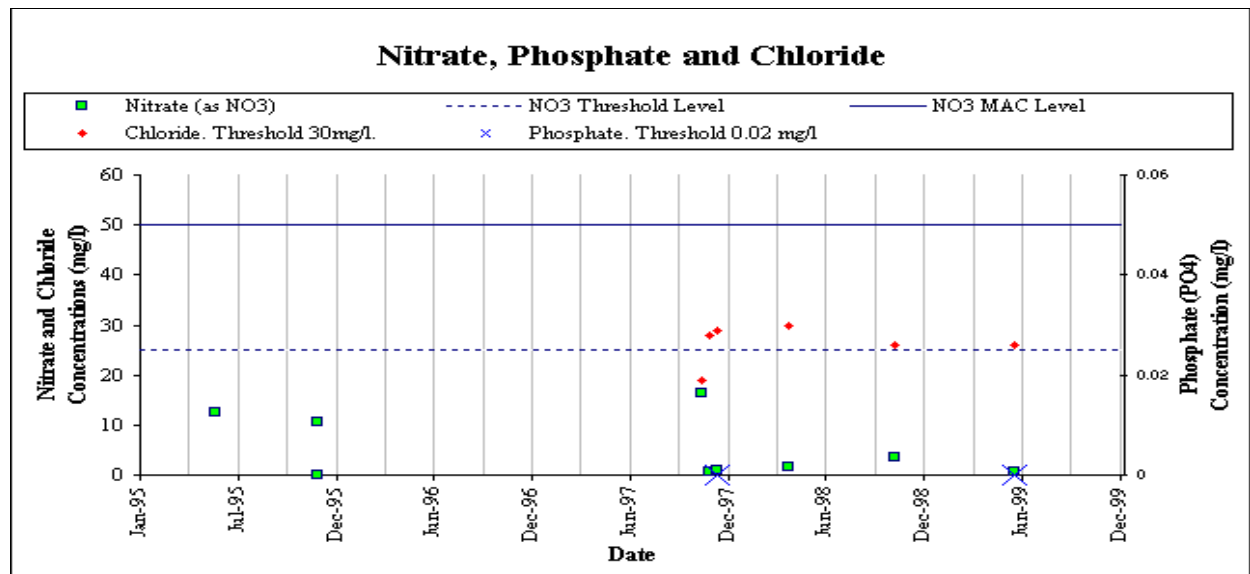


Figure 41-Roundwood GWS
Key indicators of agricultural and Domestic Groundwater Contamination

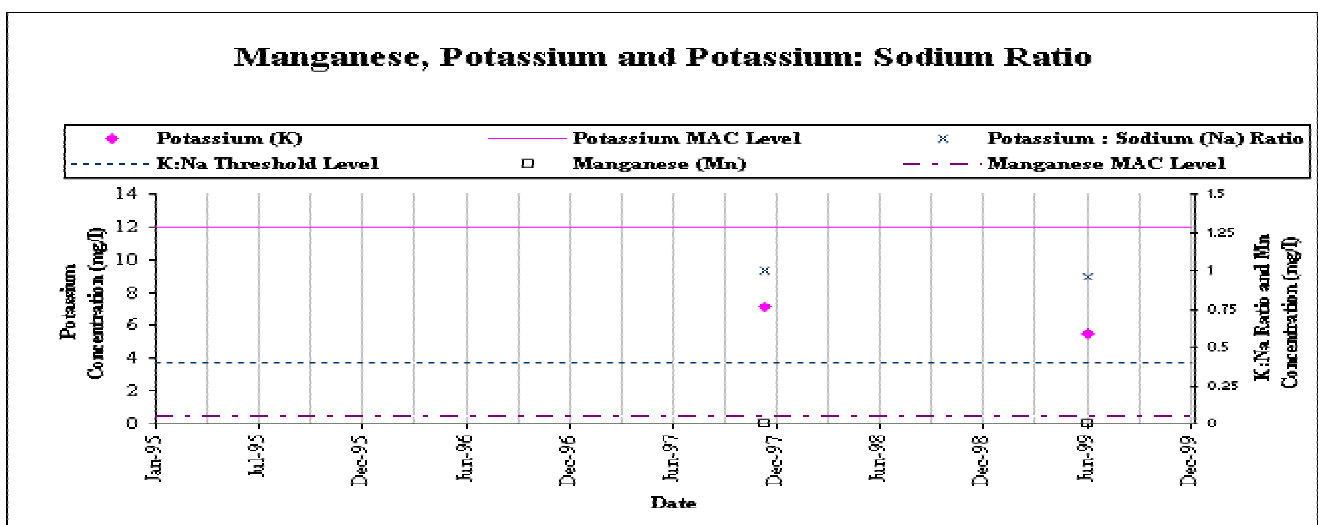
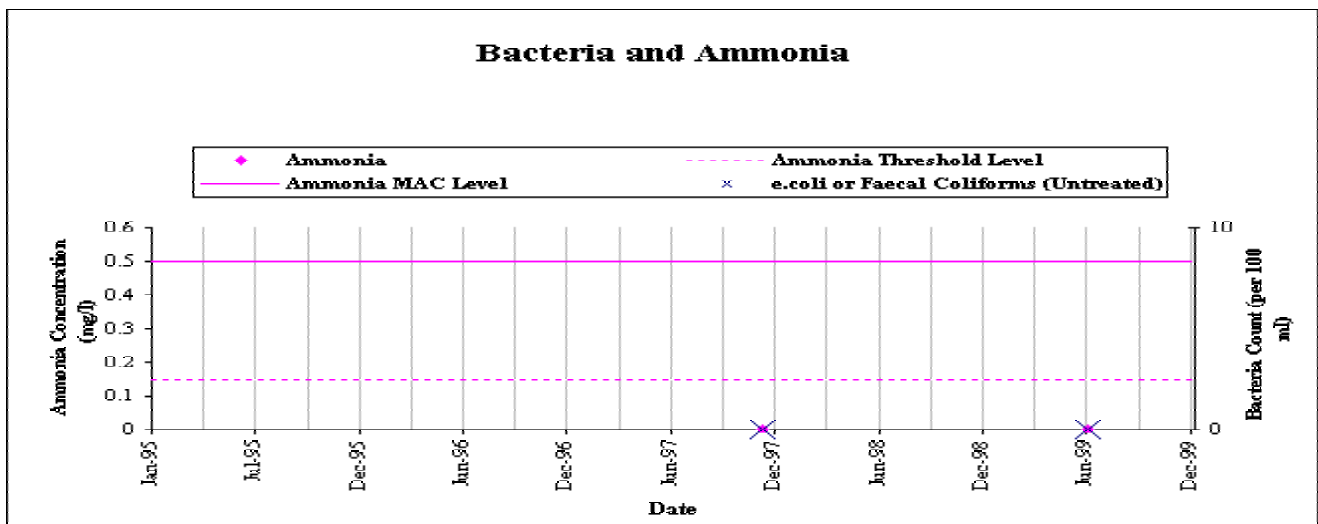
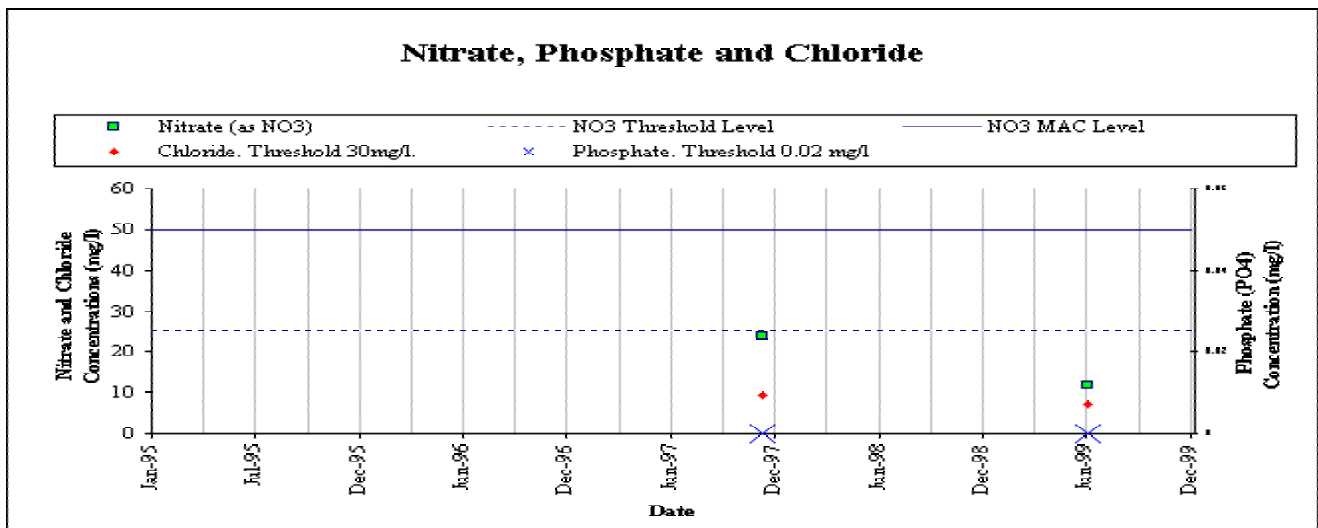


Figure 42-Shanahoe, Ballacolla
Key indicators of agricultural and Domestic Groundwater Contamination

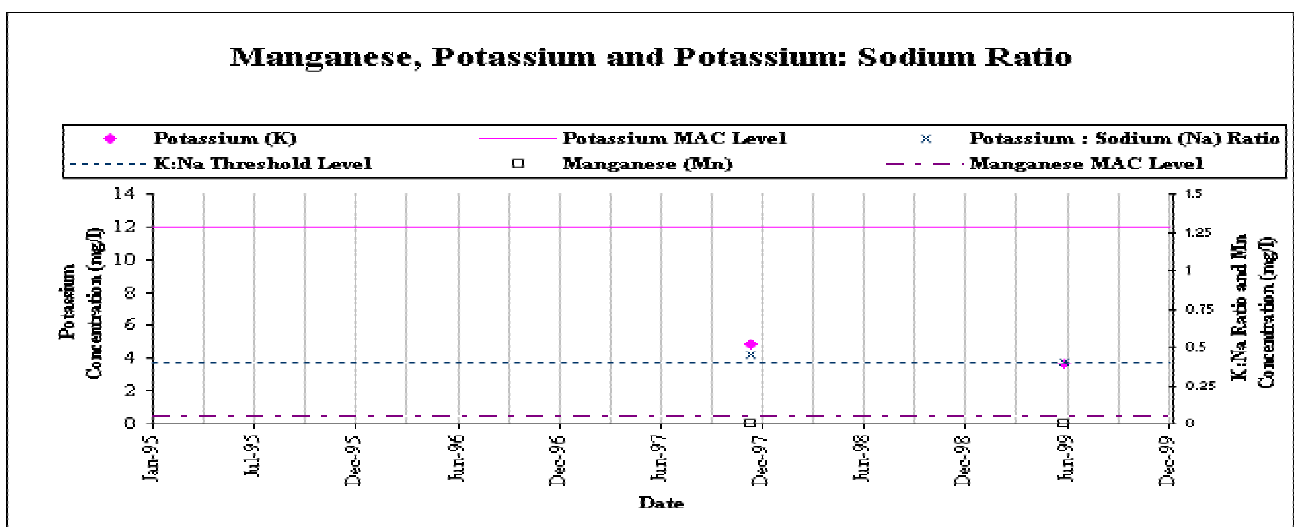
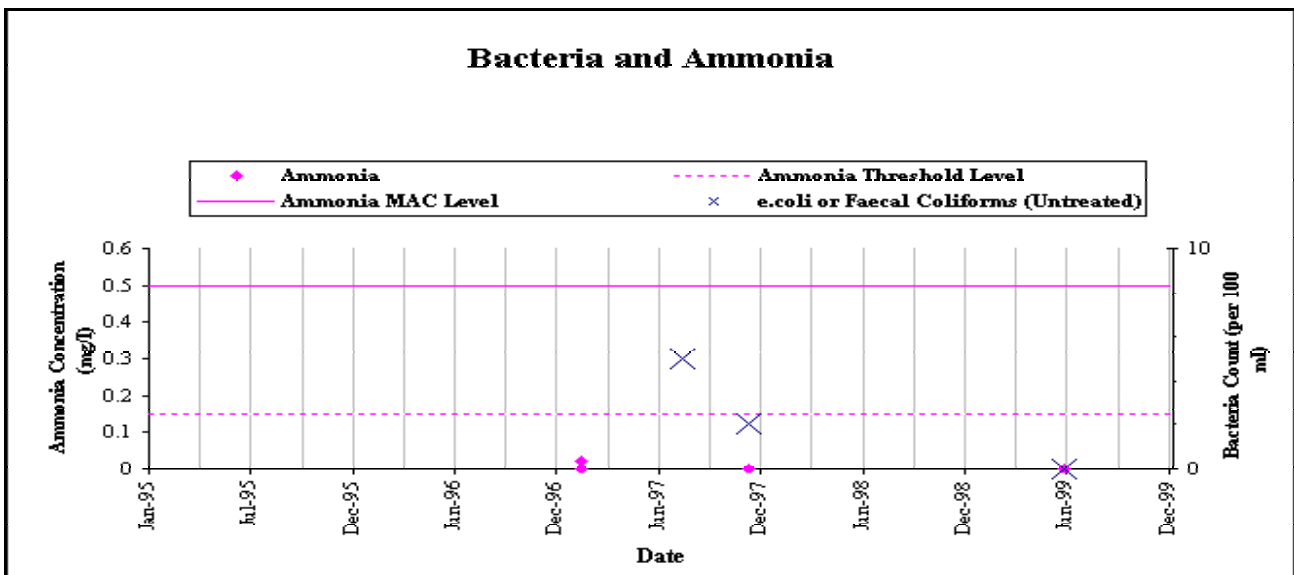
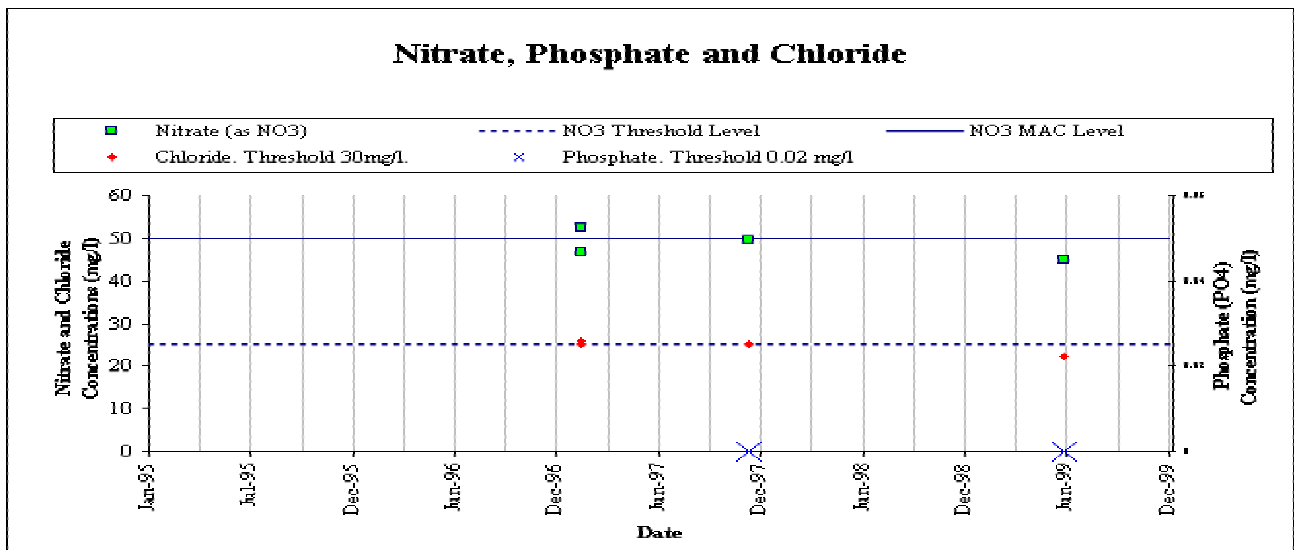


Figure 43-Shanbeg, Rosenallis
Key indicators of agricultural and Domestic Groundwater Contamination

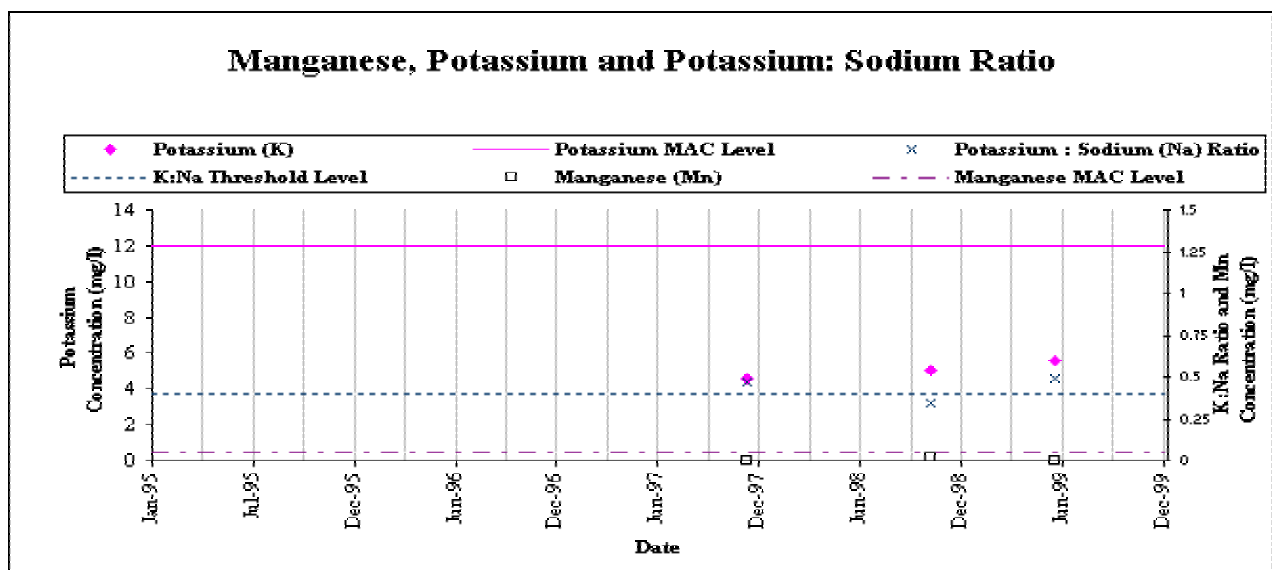
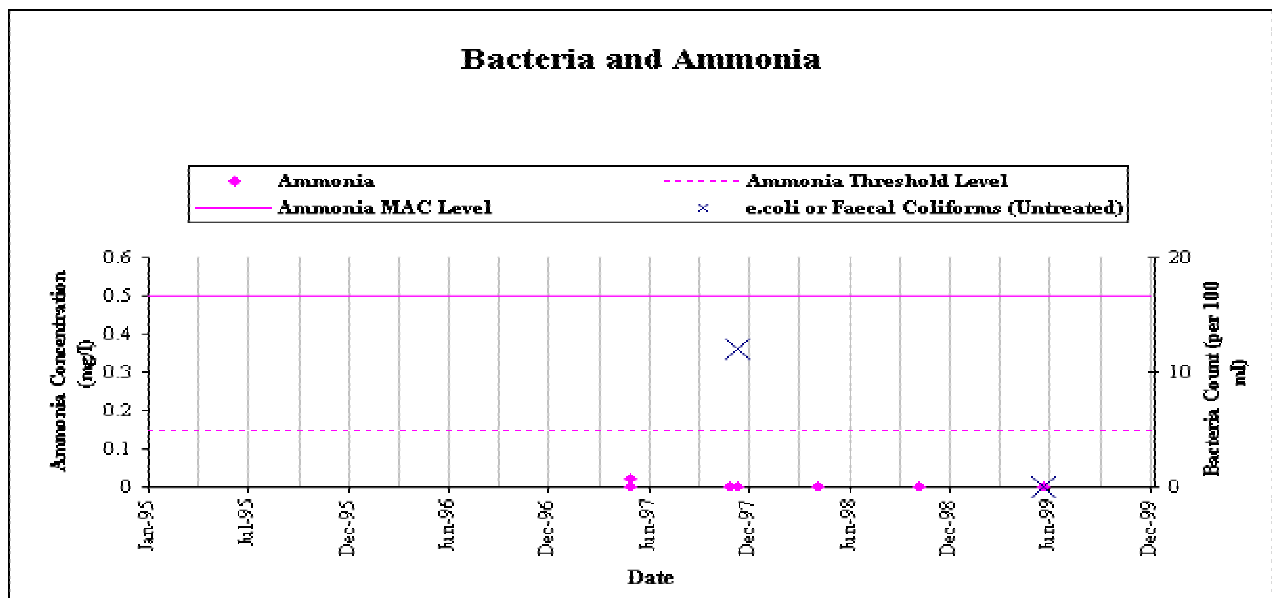
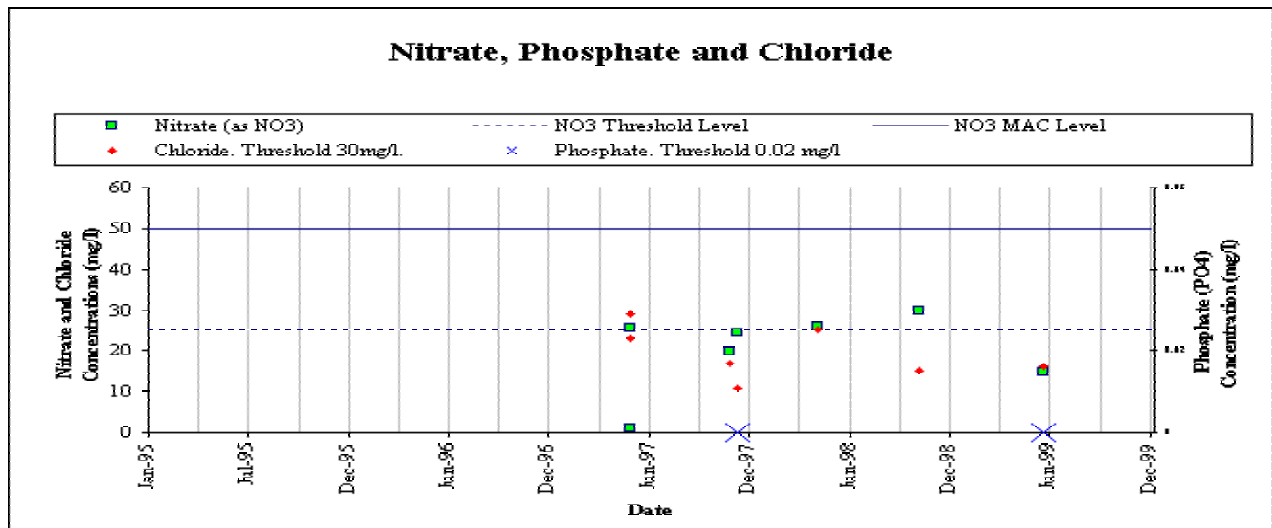


Figure 44-The Heath
Key indicators of agricultural and Domestic Groundwater Contamination

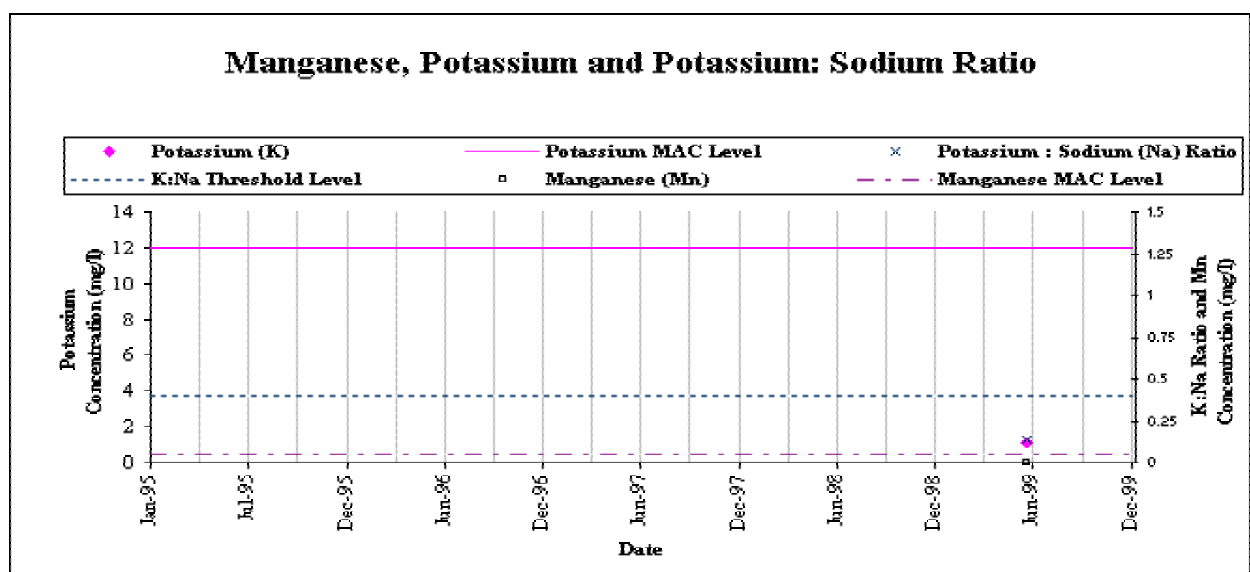
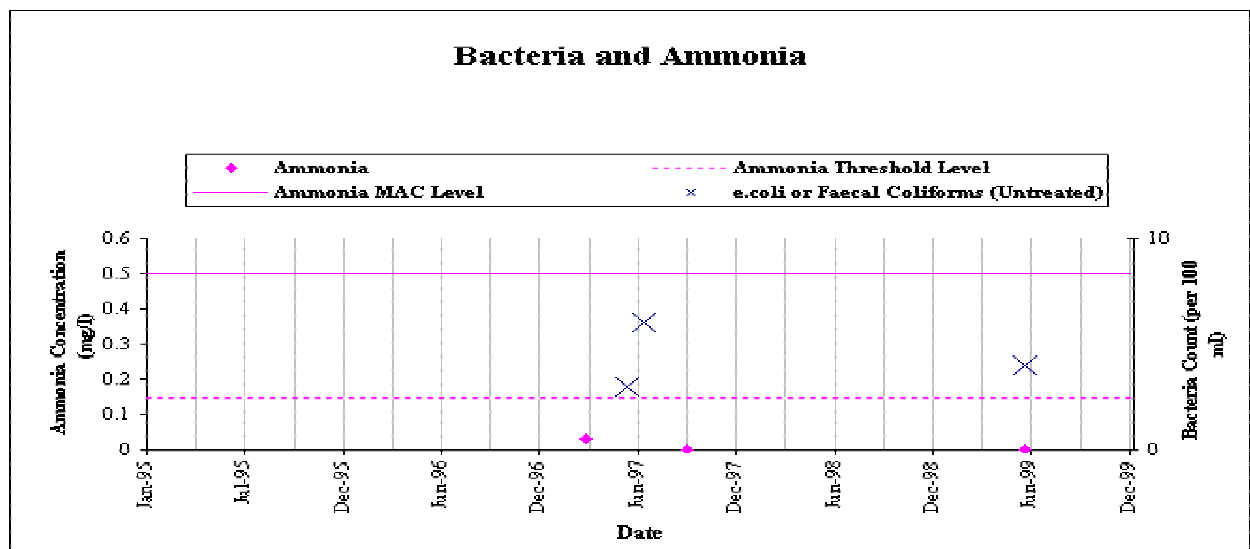
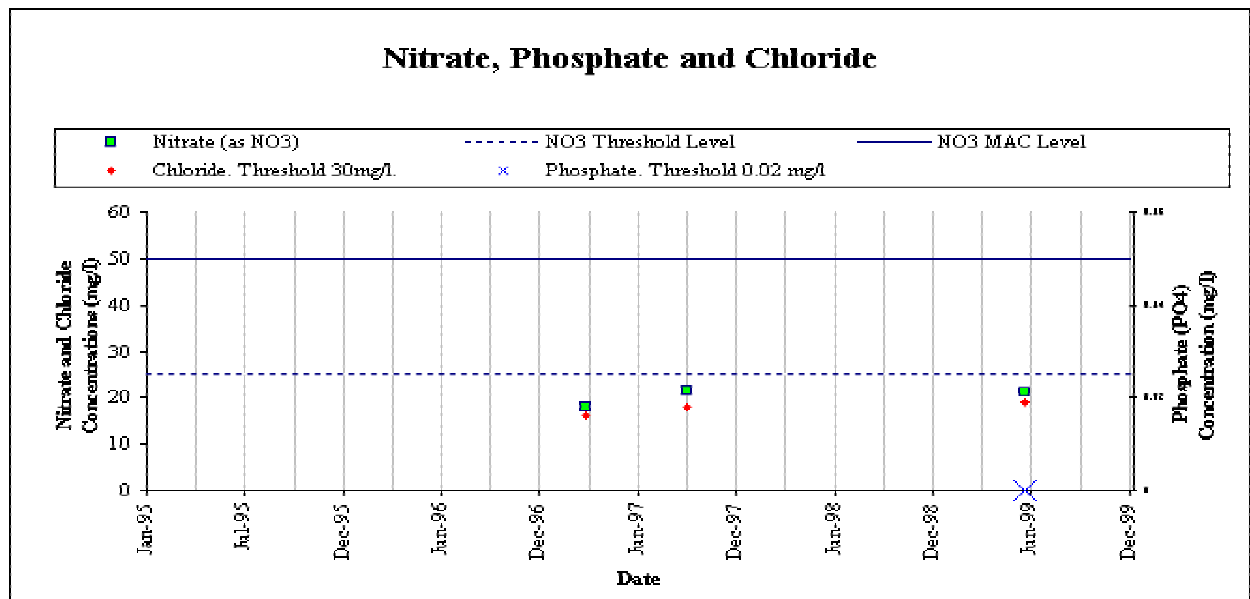


Figure 45-The Orchard, Timahoe
Key indicators of agricultural and Domestic Groundwater Contamination

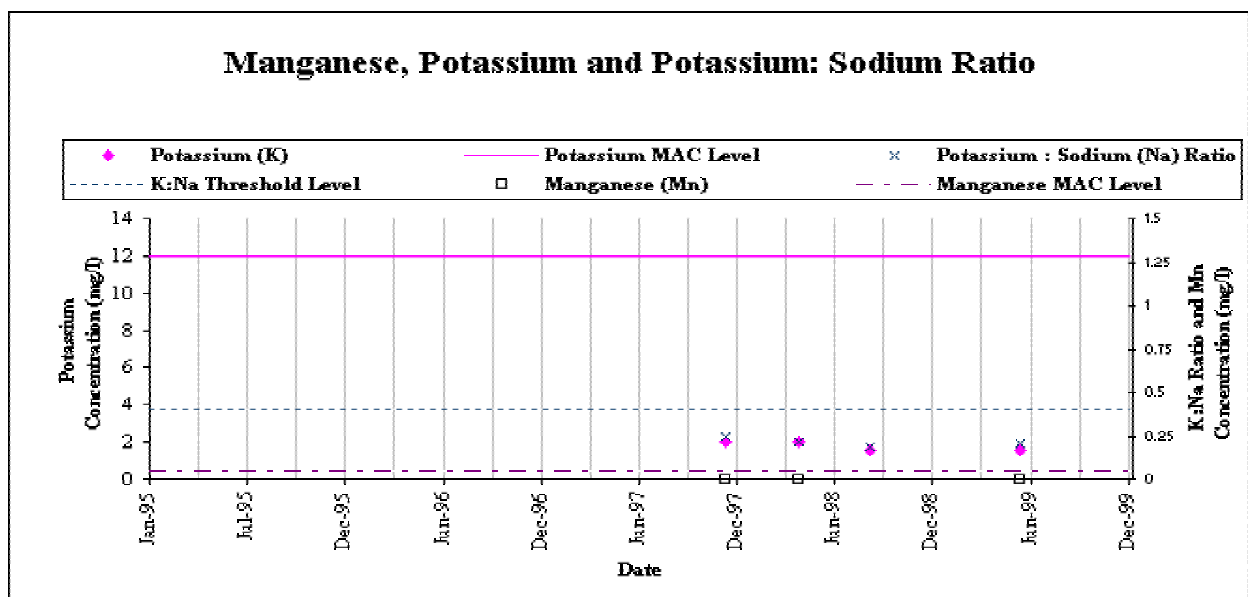
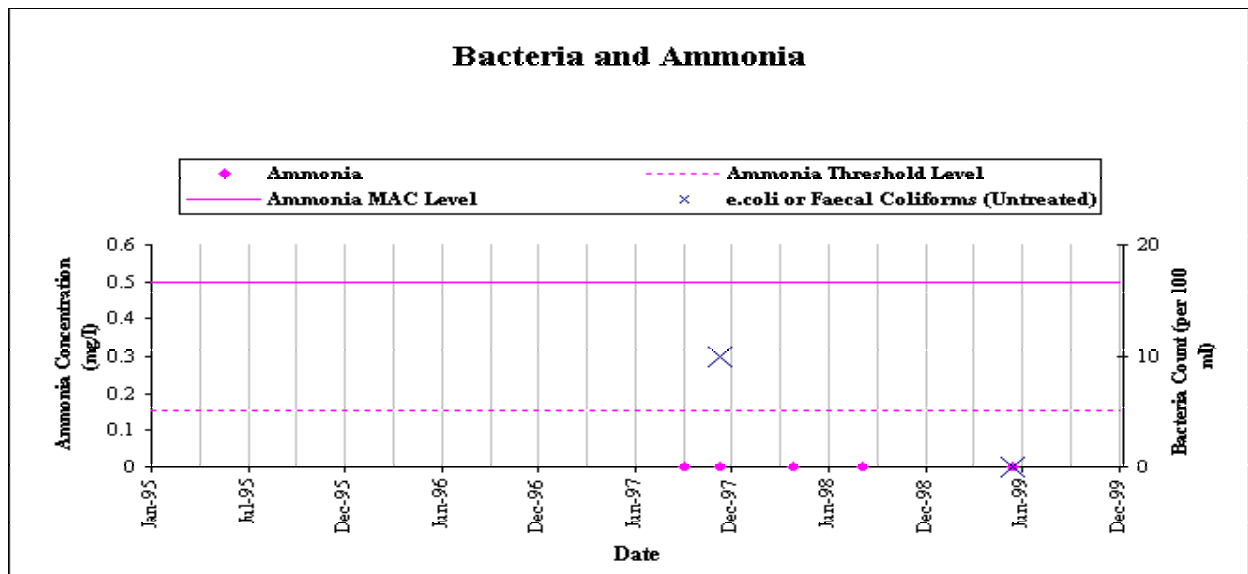
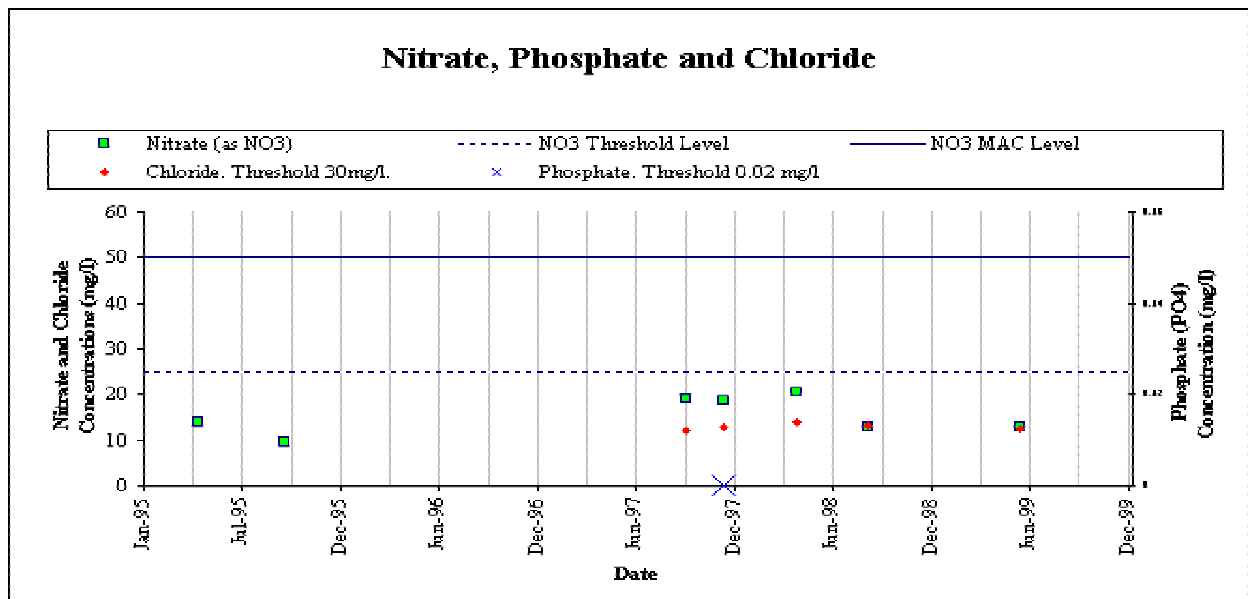


Figure 46-The Strand GWS
Key indicators of agricultural and Domestic Groundwater Contamination

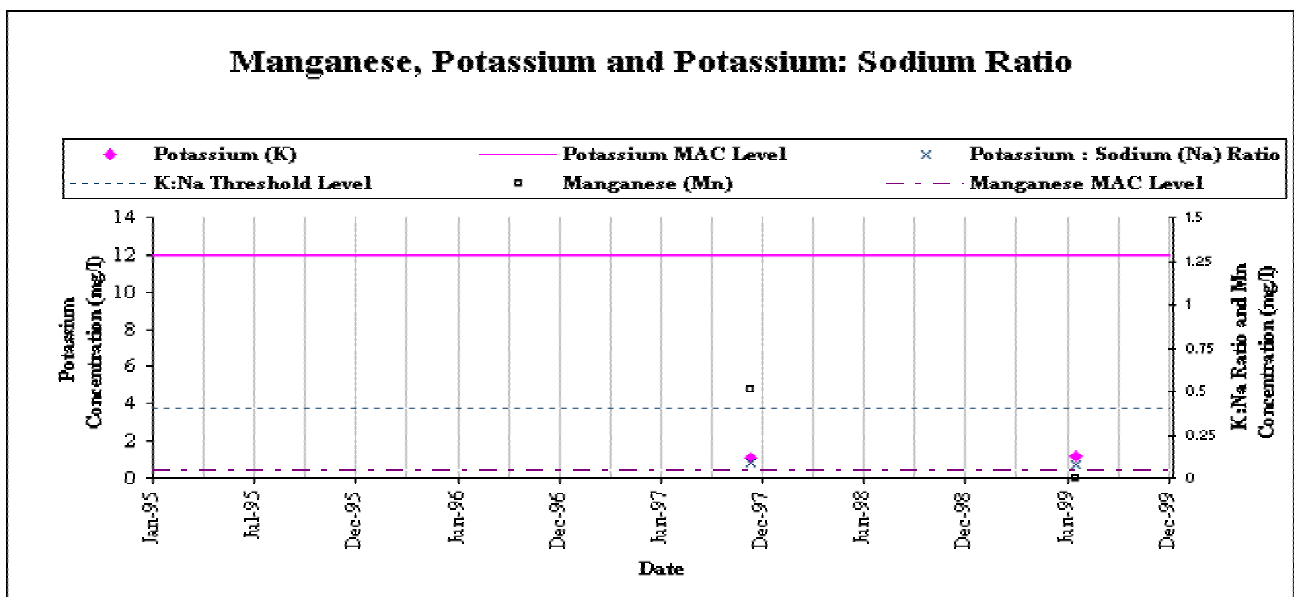
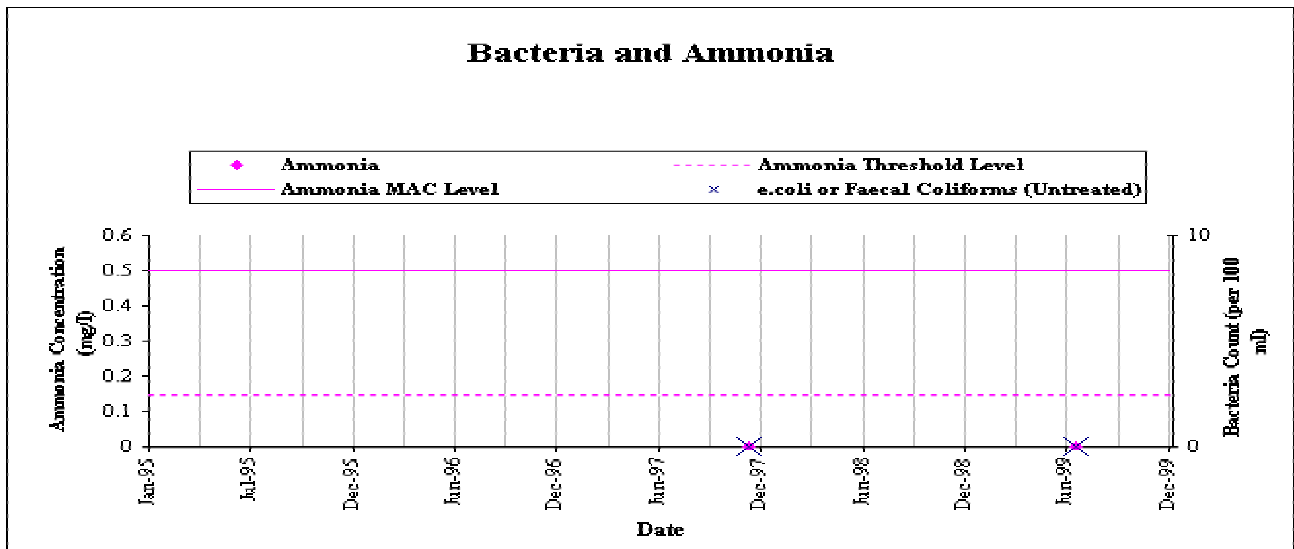
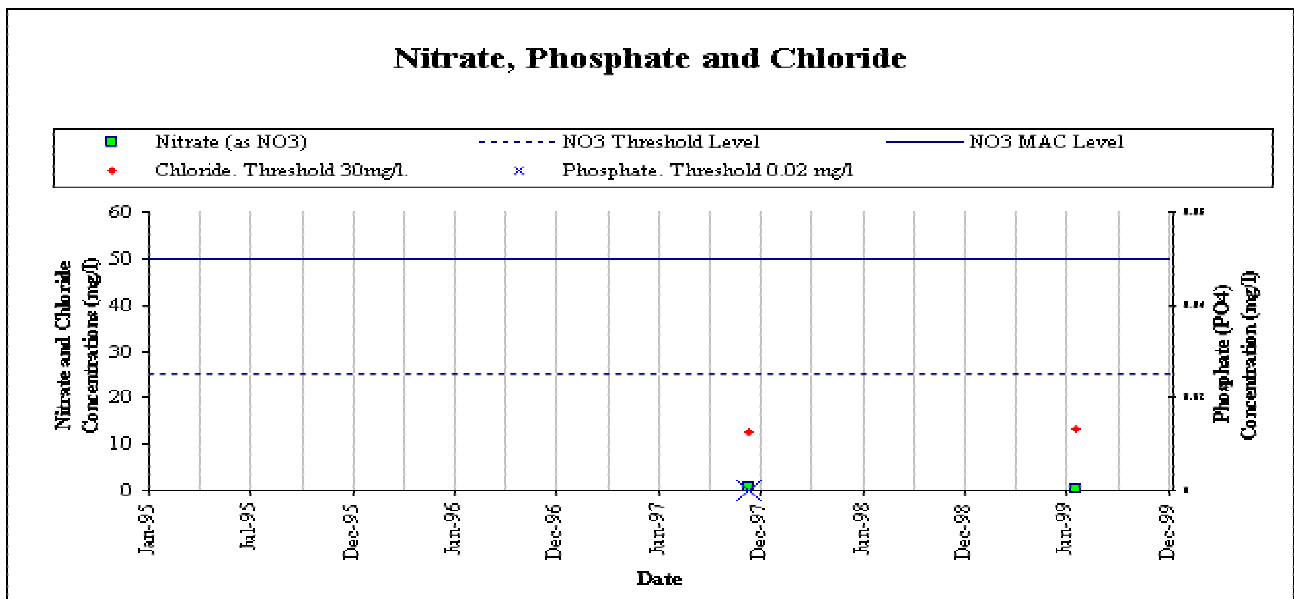


Figure 47-The Swan
Key indicators of agricultural and Domestic Groundwater Contamination

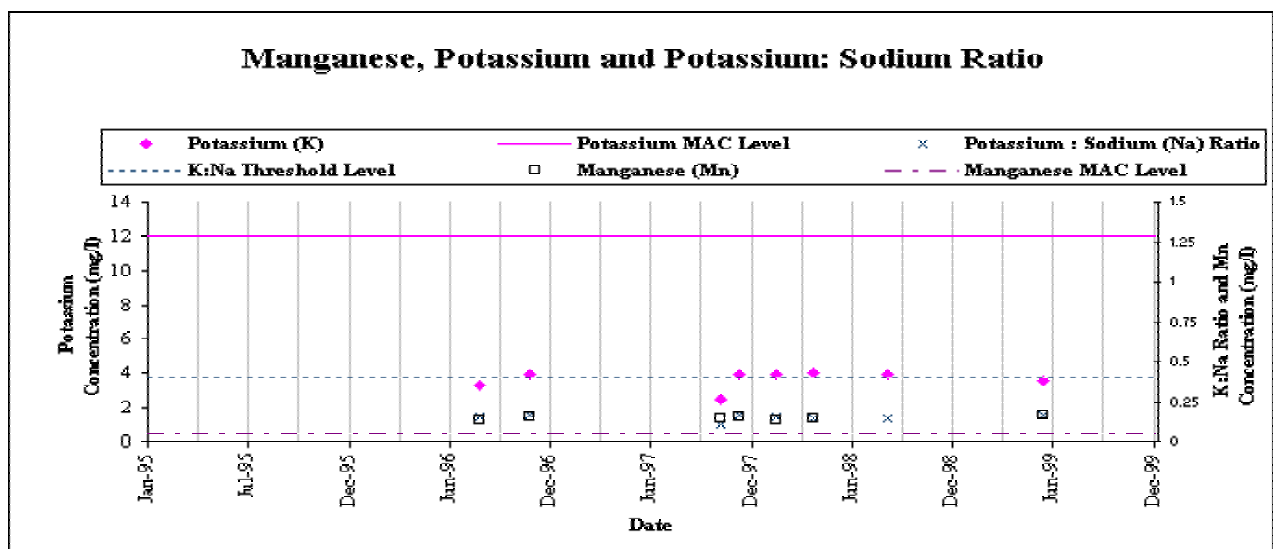
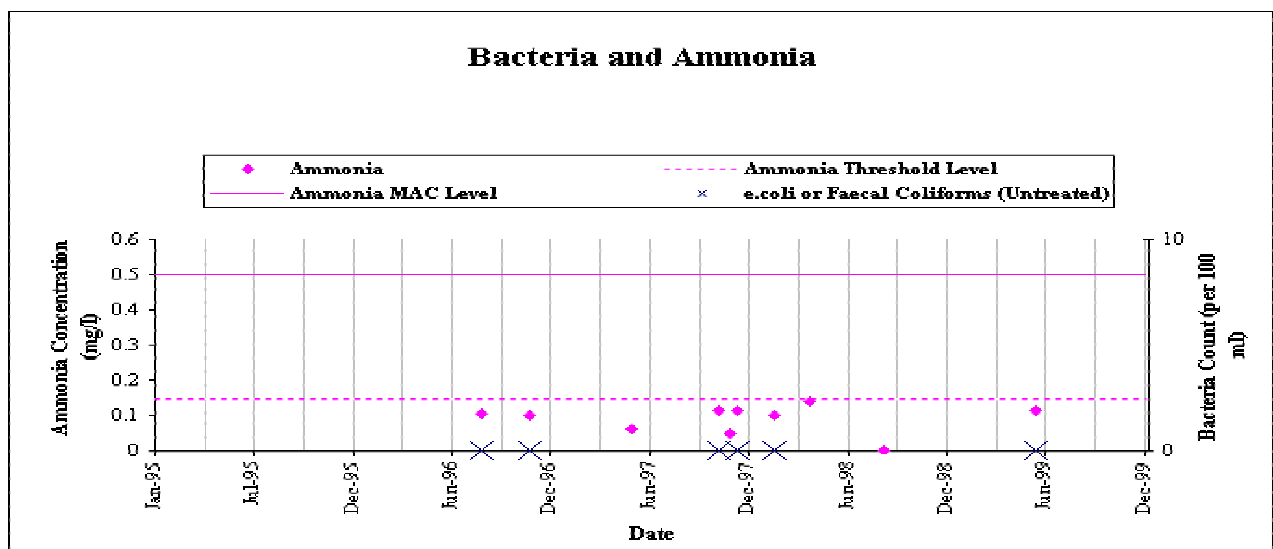
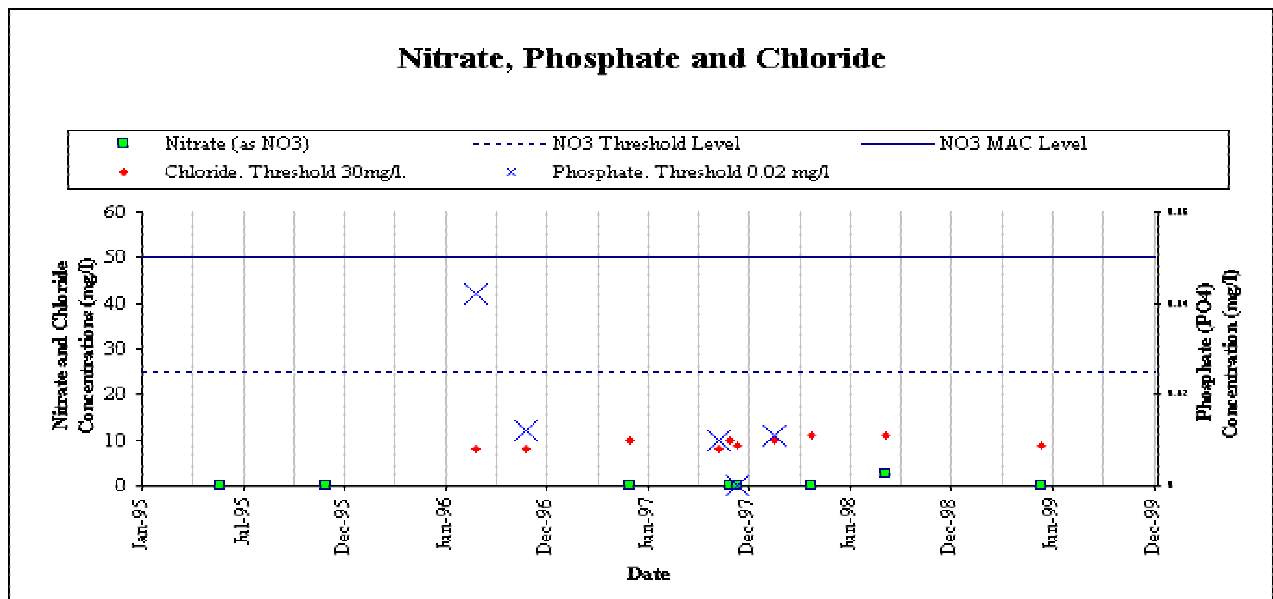


Figure 48-Tinraheen
Key indicators of agricultural and Domestic Groundwater Contamination

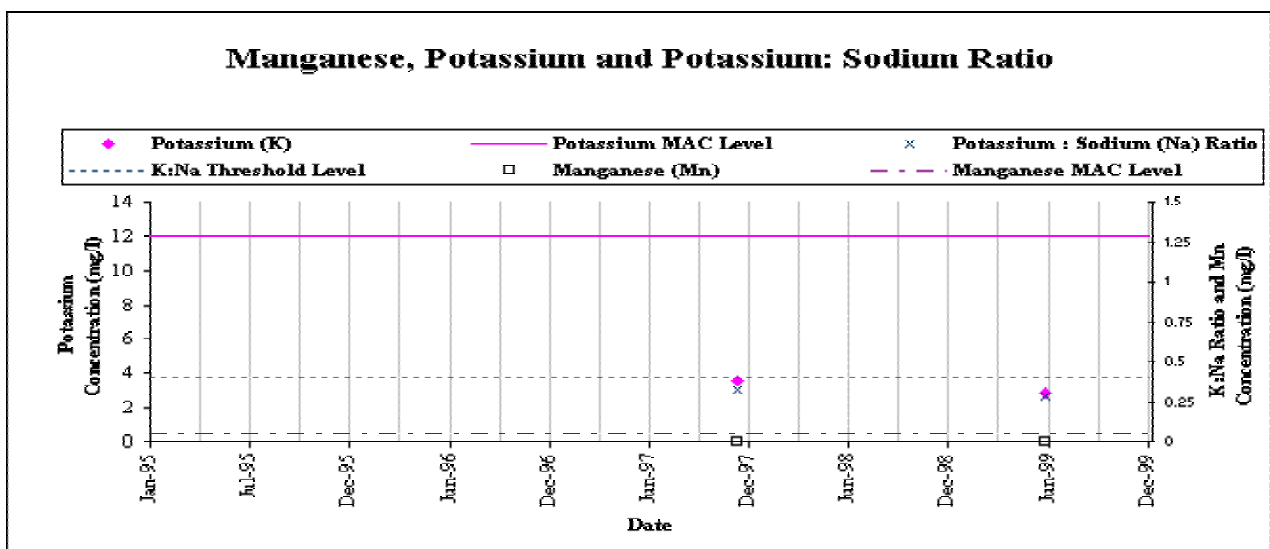
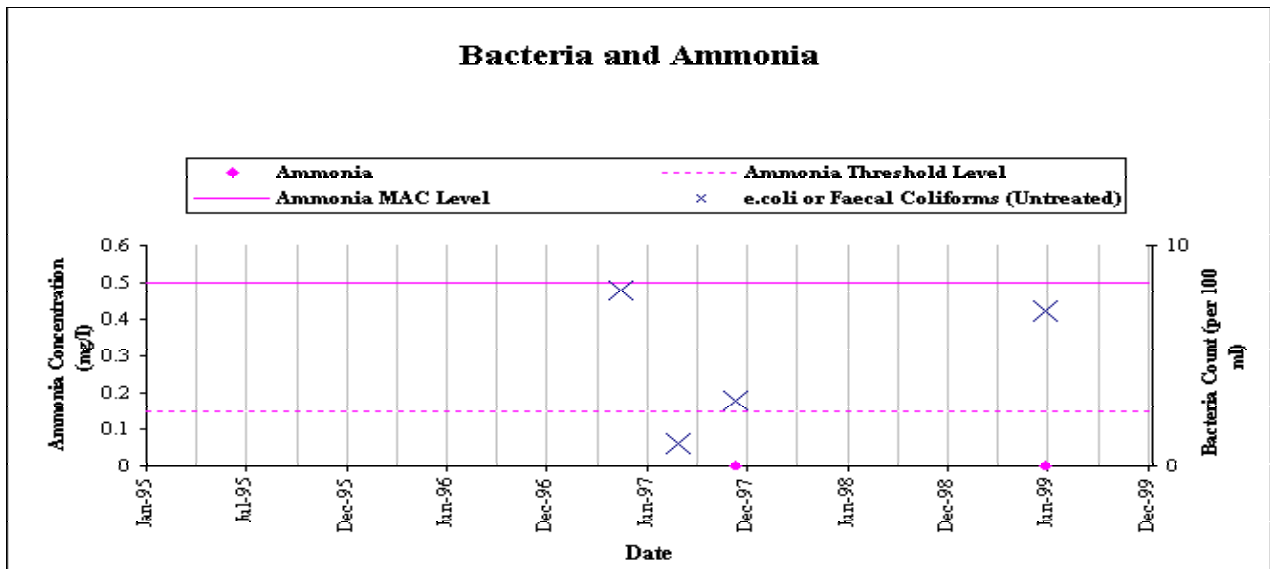
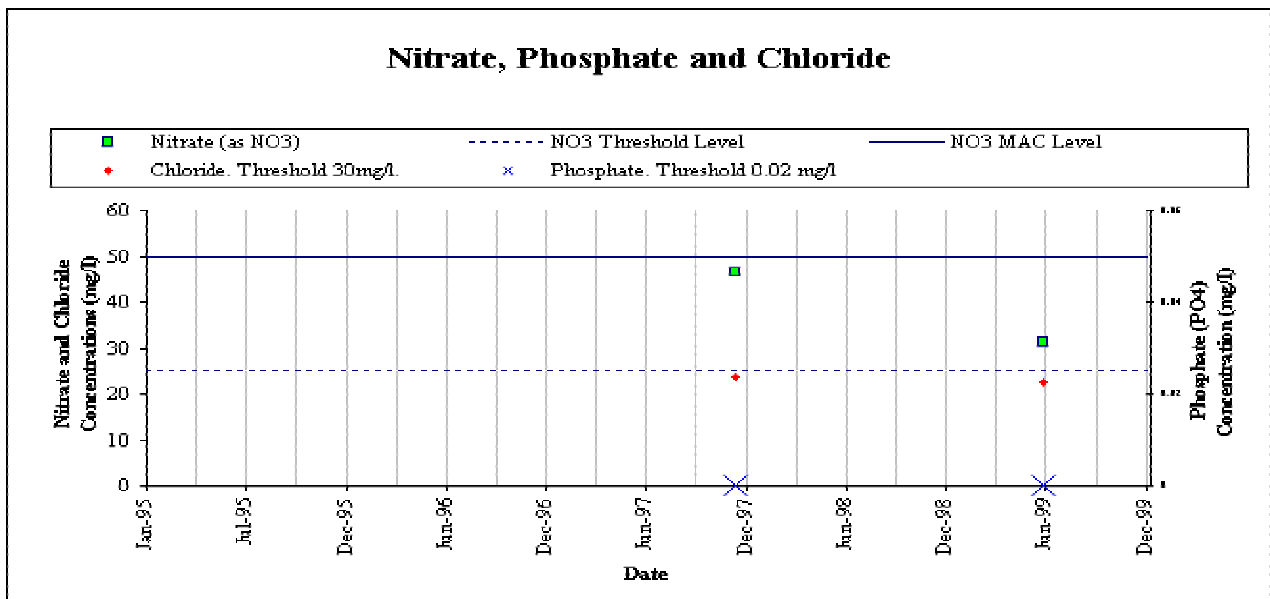


Figure 49-Townspark, Borris-in- Ossory
Key indicators of agricultural and Domestic Groundwater Contamination

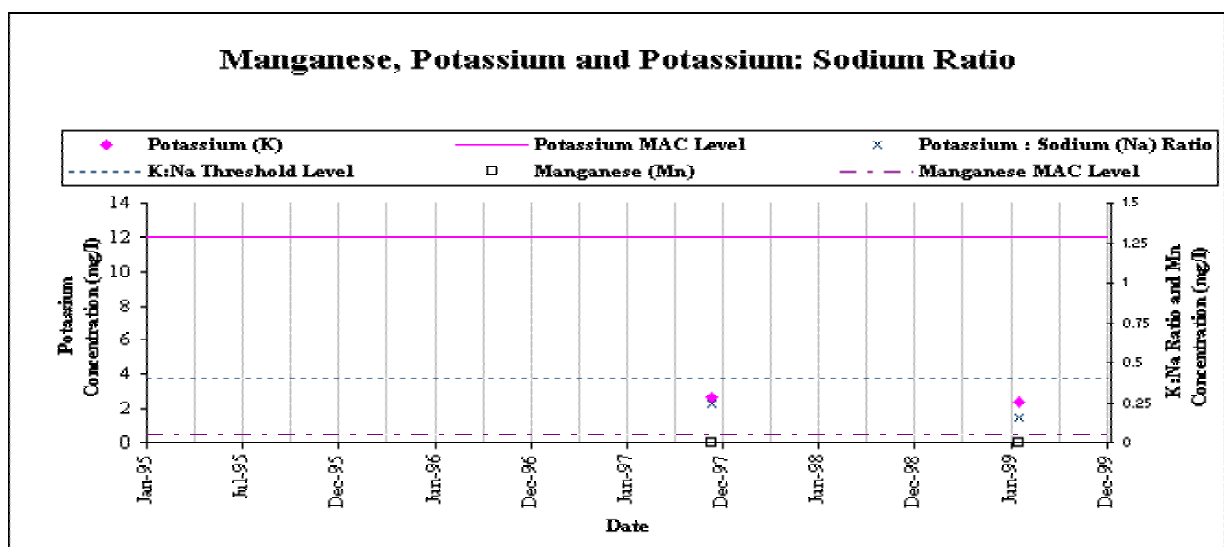
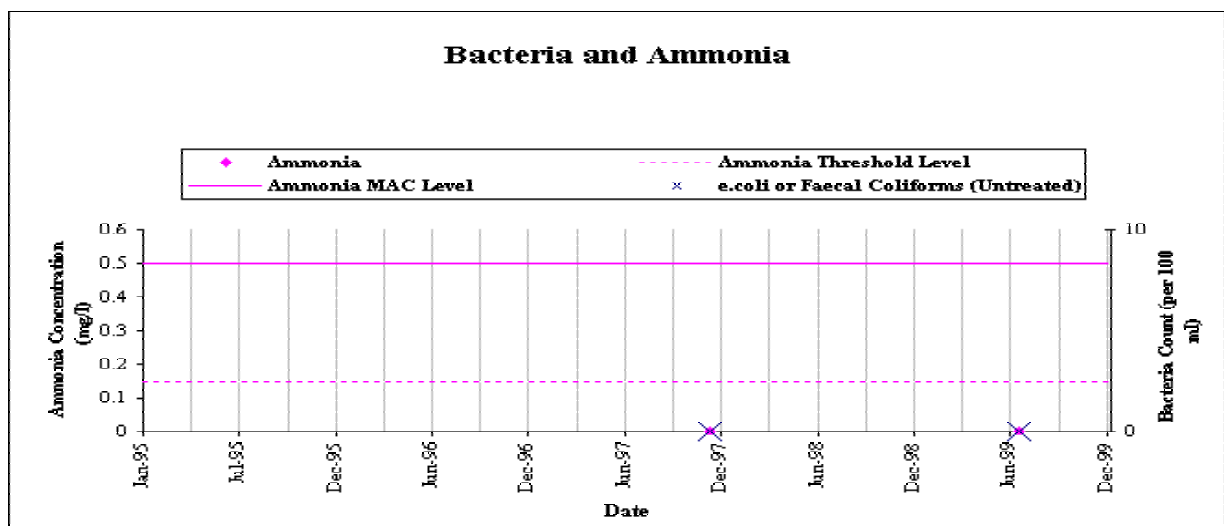
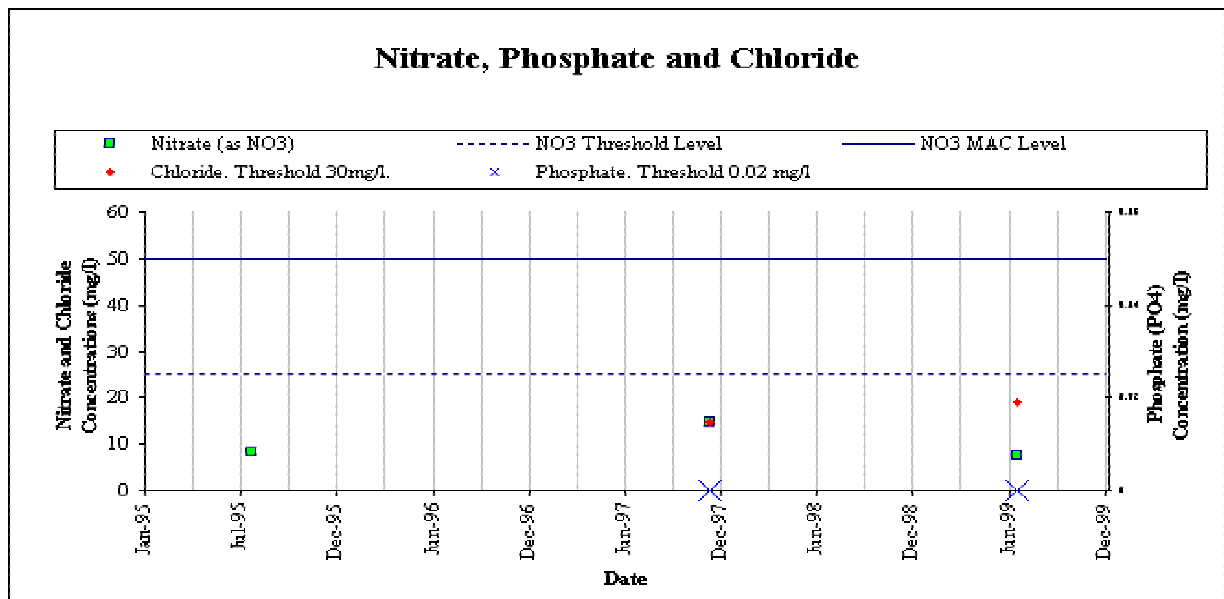
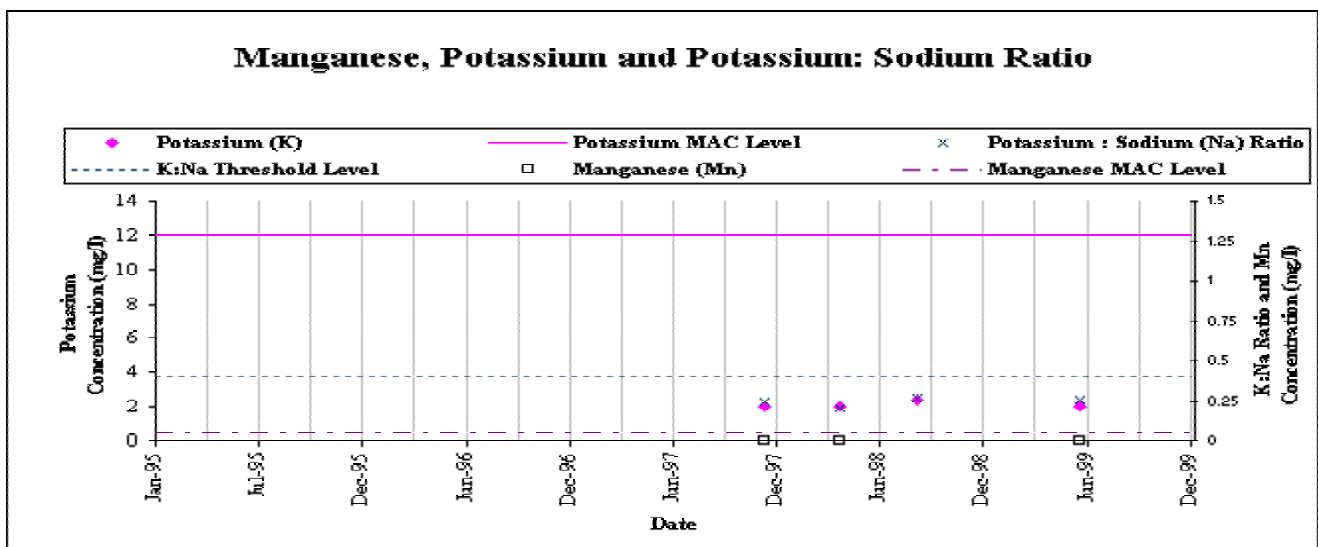
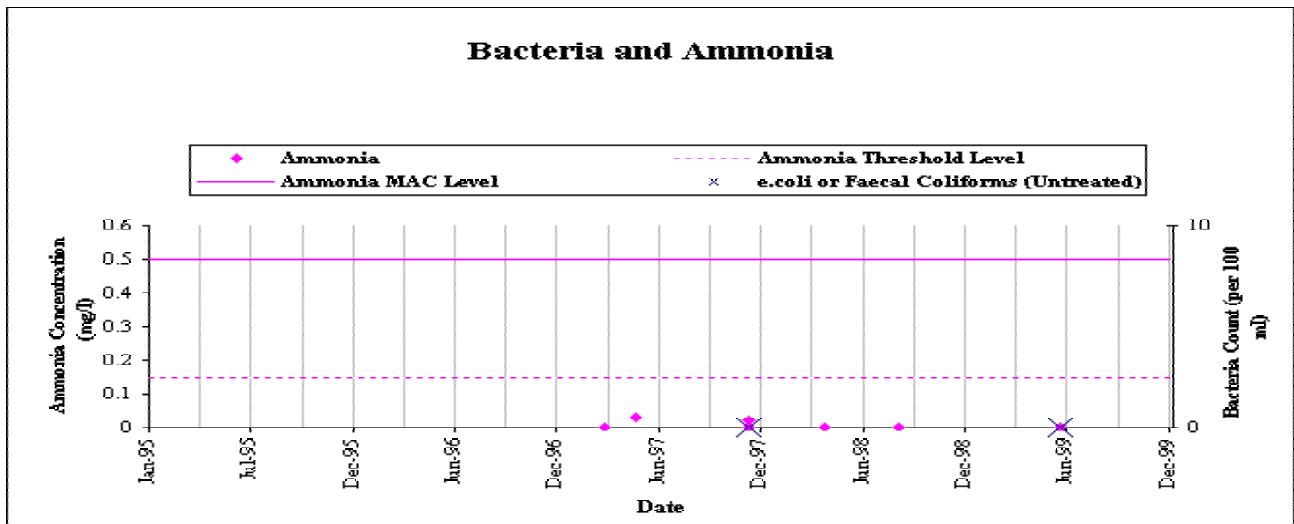
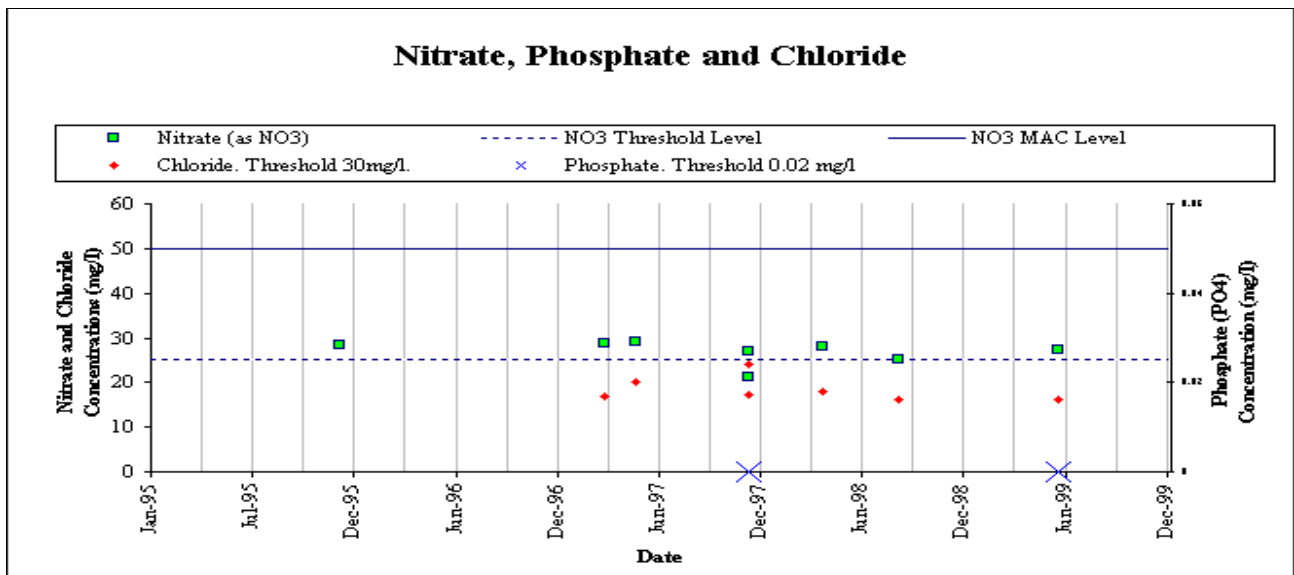


Figure 50-Tullore, Ballyroan
Key indicators of agricultural and Domestic Groundwater Contamination



APPENDIX B

Appendix B: Results of GSI/Midland Health Board/State Laboratory Sampling and Analysis in December 1997

Supply Source	Date Sampling	Concentration (mg/l)																	TC	E. coli
		NO3	Ca	Mg	K	Na	Cl	NO2	SO4	Alk	Hard	Cond	Al	Fe	Mn	NH4	NH4 (Co.Co)			
																		(count per 100 ml)		
Aries	7-Dec-97	30.30	98.80	7.052	16.85	21.35	31.10	<0.1	34.50	240.0	275.7	589.0	<0.02	0.017	<0.005	<0.015		4	1	
Attanagh GWS.	7-Dec-97	54.00	130.5	10.39	7.655	10.57	20.50	<0.1	16.20	316.0	368.5	696.0	<0.02	0.022	<0.005	<0.015		14	0	
Aughfeerish	7-Dec-97	33.90	124.2	14.10	1.643	8.817	20.20	<0.1	13.30	280.0	368.1	591.0	<0.02	0.071	<0.005	<0.015				
Ballinabranagh	7-Dec-97	4.300	93.46	15.19	0.985	9.001	16.40	<0.1	29.00	264.0	295.9	517.0	<0.02	0.010	0.182	<0.015		0	0	
Ballydavis 1	7-Dec-97	29.50	114.3	11.25	2.079	8.759	21.20	<0.1	17.00	252.0	331.7	557.0	<0.02	0.013	<0.005	<0.015		0	0	
Ballydavis 2	7-Dec-97	10.40	95.28	10.94	1.829	7.739	16.40	<0.1	11.80	266.0	283.0	521.0	<0.02	0.015	0.070	<0.015		0	0	
Ballypickas GWS	7-Dec-97	24.70	128.5	12.85	1.625	7.962	17.50	<0.1	12.90	348.0	373.7	671.0	<0.02	0.006	<0.005	<0.015		0	0	
Barrow House	7-Dec-97	60.30	125.1	9.578	5.893	16.45	31.60	<0.1	43.00	260.0	351.9	666.0	<0.02	<0.005	<0.005	<0.015		0	0	
Byrnes, Borris-in-Ossory	7-Dec-97	6.900	177.6	6.809	2.690	11.00	15.70	<0.1	81.30	386.0	471.4	808.0	<0.02	0.031	<0.005	<0.015		0	0	
Cavanagh's, Borris-in-Ossory	7-Dec-97	13.00	178.9	11.99	5.825	10.47	14.30	<0.1	97.50	400.0	496.2	855.0	<0.02	0.006	0.031	<0.015		1	1	
Clohogue Springs, Ballinakill	7-Dec-97	37.50	115.9	15.73	3.242	8.548	19.60	<0.1	11.80	314.0	354.2	643.0	<0.02	0.008	0.009	<0.015		46	15	
Coolenagh	7-Dec-97	13.40	107.6	14.80	1.162	9.342	17.90	<0.1	20.10	296.0	329.7	562.0	<0.02	0.026	<0.005	<0.015		0	0	
Coolfin, Ballacolla	7-Dec-97	28.00	146.2	6.658	10.16	10.63	23.70	<0.1	18.60	316.0	392.5	665.0	<0.02	0.010	0.096	0.047		32	9	
Cullahill GWS.	7-Dec-97	43.00	122.8	11.77	4.045	9.415	20.30	<0.1	12.90	310.0	355.2	655.0	<0.02	0.020	<0.005	<0.015		2	0	
Dairyhill, Ballacolla	7-Dec-97	32.80	119.3	31.01	5.295	11.01	24.50	<0.1	13.80	382.0	425.5	748.0	<0.02	0.011	<0.005	<0.015		10	4	
Darkin Well/Straboe	7-Dec-97	35.50	108.8	17.05	1.587	13.92	21.70	<0.1	18.80	302.0	342.0	636.0	<0.02	0.023	<0.005	<0.015		13	3	
Derrin, Borris-in-Ossory	7-Dec-97	19.40	165.4	6.350	2.543	12.18	18.30	<0.1	57.50	372.0	439.1	771.0	<0.02	0.034	<0.005	<0.015		0	0	
Derryguile	7-Dec-97	21.30	122.8	10.84	2.825	9.417	19.60	<0.1	26.10	324.0	351.4	651.0	<0.02	0.008	<0.005	0.122		3	0	
Donaghmore GWS.	7-Dec-97	4.300	94.57	28.13	1.438	9.071	15.90	<0.1	25.40	326.0	352.0	615.0	<0.02	0.010	<0.005	<0.015		14	1	
Drim, Mountrath	7-Dec-97	12.50	34.68	3.851	2.802	8.743	13.20	<0.1	29.70	84.00	102.5	230.0	<0.02	<0.005	<0.005	<0.015		0	0	
Durrow Convent	7-Dec-97	36.50	116.4	14.61	2.396	9.264	19.30	<0.1	15.40	300.0	350.9	629.0	<0.02	0.009	<0.005	<0.015		2	0	
Emo	7-Dec-97	41.00	143.3	9.366	4.469	10.33	27.40	<0.1	16.90	336.0	396.4	719.0	<0.02	0.009	<0.005	<0.015		20	12	
Errill A GWS.	7-Dec-97	15.40	123.1	19.11	2.020	8.617	16.70	<0.1	18.30	352.0	386.0	670.0	<0.02	0.009	<0.005	<0.015		23	0	
Errill B Gws.	7-Dec-97	31.30	141.8	11.34	4.787	9.937	22.30	<0.1	16.70	354.0	400.9	715.0	<0.02	0.022	<0.005	<0.015		26	6	
Fermoyle, Ballinakill	7-Dec-97	57.00	135.3	17.44	4.021	11.04	20.90	<0.1	42.50	324.0	409.7	743.0	<0.02	0.024	<0.005	<0.015		0	0	
Fermoyle, Durrow	7-Dec-97	46.50	130.8	19.33	2.991	10.44	23.30	<0.1	33.00	328.0	406.2	732.0	<0.02	<0.005	<0.005	<0.015		2	0	
Five Wells, Abbeyleix	7-Dec-97	26.60	133.5	14.70	2.256	8.731	16.60	<0.1	14.50	352.0	393.9	679.0	<0.02	0.030	<0.005	<0.015		3	3	
Killeaney GWS.	7-Dec-97	79.00	146.9	16.61	2.613	10.34	20.00	<0.1	13.30	356.0	435.3	783.0	<0.02	0.011	<0.005	<0.015		0	0	
Killennard GWS.	7-Dec-97	34.50	142.1	7.490	3.664	9.848	15.50	<0.1	14.80	346.0	385.8	679.0	<0.02	<0.005	<0.005	<0.015		14	8	
Knocks Bore, Mountrath	7-Dec-97	10.40	57.28	3.078	1.557	6.703	12.50	<0.1	8.100	140.0	155.7	305.0	<0.02	0.008	<0.005	<0.015		1	0	
Knocks Springs, Mountrath	7-Dec-97	2.200	17.36	3.002	2.440	5.979	10.10	<0.1	4.500	48.00	55.72	132.0	0.048	0.324	0.009	0.032	>100	>100		
Kyle	7-Dec-97	23.80	112.2	9.301	1.552	8.049	17.00	<0.1	11.50	256.0	318.4	507.0	<0.02	<0.005	<0.005	<0.015		4	2	
Lough, Ballybrittas	7-Dec-97	14.10	134.1	12.37	3.242	11.25	23.20	<0.1	35.60	328.0	385.9	686.0	<0.02	0.012	0.018	<0.015		1	0	
Lough, Portarlinton	7-Dec-97	24.50	123.3	13.06	1.831	10.84	23.10	<0.1	28.50	324.0	361.7	676.0	<0.02	<0.005	<0.005	<0.015		10	0	
Meelick	Not sampled																			
Max Well	7-Dec-97	24.30	131.9	12.85	1.374	8.282	17.00	<0.1	13.20	348.0	382.3	669.0	<0.02	<0.005	<0.005	<0.015		0	0	
Mountsalem GWS.	7-Dec-97	16.00	38.91	6.373	1.296	8.138	13.40	<0.1	6.100	104.0	123.4	259.0	<0.02	<0.005	<0.005	<0.015		14	2	
Ralish GWS.	7-Dec-97	31.50	128.3	13.98	1.615	8.035	18.60	<0.1	12.20	344.0	377.8	674.0	<0.02	<0.005	<0.005	<0.015		0	0	
Rathdowney WW2B	7-Dec-97	23.20	103.1	31.87	0.925	6.936	15.40	<0.1	11.00	352.0	388.7	657.0	<0.02	0.034	<0.005	<0.015		0	0	
Rosenallis	7-Dec-97	1.000	86.64	31.59	5.917	19.30	28.80	<0.1	34.90	322.0	346.4	657.0	<0.02	0.086	0.035	0.052		0	0	
Roundwood GWS.	7-Dec-97	23.80	123.1	5.380	7.144	7.165	9.400	<0.1	13.60	310.0	329.5	599.0	<0.02	<0.005	<0.005	<0.015		2	0	
Shanahoe, Ballacolla	7-Dec-97	49.50	114.4	27.97	4.852	10.72	25.20	<0.1	20.30	328.0	400.8	719.0	<0.02	0.022	<0.005	<0.015		2	2	
Shanbeg, Rosenallis	7-Dec-97	24.40	115.4	10.43	4.586	9.791	10.70	<0.1	12.40	324.0	331.2	618.0	<0.02	0.011	<0.005	<0.015		13	12	
The Heath	Not sampled																			
The Orchard, Timahoe	7-Dec-97	18.50	106.0	5.951	2.018	8.247	12.90	<0.1	9.800	264.0	289.1	507.0	<0.02	0.005	<0.005	<0.015		72	10	
The Strand GWS	7-Dec-97	0.770	100.2	16.01	1.130	13.15	12.60	<0.1	12.00	314.0	316.0	567.0	0.032	0.026	0.512	<0.015		0	0	
The Swan	7-Dec-97	<0.1	45.16	26.36	3.908	24.02	8.600	<0.1	34.10	234.0	221.3	463.0	<0.02	0.138	0.158	0.114		0	0	
Tinaraheen, Ballacolla	7-Dec-97	46.50	146.1	20.89	3.548	10.83	23.60	<0.1	57.00	344.0	450.8	783.0	<0.02	0.025	<0.005	<0.015		10	3	
Townspark, Borris-in-Ossory	7-Dec-97	14.70	161.2	6.312	2.696	11.05	14.70	<0.1	46.00	376.0	428.6	747.0	<0.02	0.007	<0.005	<0.015		0	0	
Tullore, Ballyroan	7-Dec-97	26.80	118.0	11.12	2.055	8.546	17.30	<0.1	14.10	306.0	340.4	615.0	<0.02	0.005	<0.005	<0.015		0	0	

Appendix B: Results of GSI/Midland Health Board/State Laboratory Sampling and Analysis in December 1997

Supply Source	Date Sampling	Concentration (mg/l)																
		Ba	B	Cd	Cr	Cu	F	Pb	Hg	Ni	PO4	P	Se	Ag	Sr	Zn	Ant	As
Aries	7-Dec-97	0.012	0.044	<0.005	<0.005	0.070	<0.25	<0.02		<0.01	<0.5	<0.25	<0.05	<0.005	0.168	0.026	<0.02	<0.05
Attanagh GWS.	7-Dec-97	0.057	0.032	<0.005	<0.005	0.019	<0.25	<0.02		<0.01	<0.5	<0.25	<0.05	<0.005	0.200	0.025	<0.02	<0.05
Aughfeerish	7-Dec-97	0.090	0.029	<0.005	<0.005	<0.005	<0.25	<0.02		<0.01	<0.5	<0.25	<0.05	<0.005	0.184	0.296	<0.02	<0.05
Ballinabranagh	7-Dec-97	0.012	0.015	<0.005	<0.005	<0.005	<0.25	<0.02		<0.01	<0.5	<0.25	<0.05	<0.005	0.336	0.023	<0.02	<0.05
Ballydavis 1	7-Dec-97	0.066	0.026	<0.005	<0.005	0.009	<0.25	<0.02		<0.01	<0.5	<0.25	<0.05	<0.005	0.199	0.021	<0.02	<0.05
Ballydavis 2	7-Dec-97	0.061	0.007	<0.005	<0.005	<0.005	<0.25	<0.02		<0.01	<0.5	<0.25	<0.05	<0.005	0.171	0.064	<0.02	<0.05
Ballypickas GWS	7-Dec-97	0.108	0.021	<0.005	<0.005	0.005	<0.25	<0.02		<0.01	<0.5	<0.25	<0.05	<0.005	0.200	0.028	<0.02	<0.05
Barrow House	7-Dec-97	0.039	0.145	<0.005	<0.005	0.005	<0.25	<0.02		<0.01	<0.5	<0.25	<0.05	<0.005	0.175	0.011	<0.02	<0.05
Byrnes, Borris-in-Ossory	7-Dec-97	0.175	0.036	<0.005	<0.005	<0.005	<0.25	<0.02		<0.01	<0.5	<0.25	<0.05	<0.005	0.412	0.026	<0.02	<0.05
Cavanagh's, Borris-in-Ossory	7-Dec-97	0.163	0.037	<0.005	<0.005	<0.005	<0.25	<0.02		<0.01	<0.5	<0.25	<0.05	<0.005	0.532	0.023	<0.02	<0.05
Clohogue Springs, Ballinakill	7-Dec-97	0.115	0.018	<0.005	<0.005	0.005	<0.25	<0.02		<0.01	<0.5	<0.25	<0.05	<0.005	0.179	0.012	<0.02	<0.05
Coolenagh	7-Dec-97	0.006	0.014	<0.005	<0.005	0.007	<0.25	<0.02		<0.01	<0.5	<0.25	<0.05	<0.005	0.176	0.123	<0.02	<0.05
Coolfin, Ballacolla	7-Dec-97	0.140	0.040	<0.005	<0.005	<0.005	<0.25	<0.02		<0.01	<0.5	<0.25	<0.05	<0.005	0.286	0.016	<0.02	<0.05
Cullahill GWS.	7-Dec-97	0.038	0.036	<0.005	<0.005	0.006	<0.25	<0.02		<0.01	<0.5	<0.25	<0.05	<0.005	0.166	0.027	<0.02	<0.05
Dairyhill, Ballacolla	7-Dec-97	0.072	0.023	<0.005	<0.005	<0.005	<0.25	<0.02		<0.01	<0.5	<0.25	<0.05	<0.005	0.170	0.014	<0.02	<0.05
Darkin Well/Straboe	7-Dec-97	0.146	0.121	<0.005	<0.005	<0.005	<0.25	<0.02		<0.01	<0.5	<0.25	<0.05	<0.005		0.024	<0.02	<0.05
Derrin, Borris-in-Ossory	7-Dec-97	0.159	0.033	<0.005	<0.005	0.006	<0.25	<0.02		<0.01	<0.5	<0.25	<0.05	<0.005	0.427	0.031	<0.02	<0.05
Derryguile	7-Dec-97	0.050	0.025	<0.005	<0.005	<0.005	<0.25	<0.02		<0.01	<0.5	<0.25	<0.05	<0.005	0.197	0.014	<0.02	<0.05
Donaghmore GWS.	7-Dec-97	0.051	0.037	<0.005	<0.005	<0.005	<0.25	<0.02		<0.01	<0.5	<0.25	<0.05	<0.005	0.923	0.023	<0.02	<0.05
Drim, Mountrath	7-Dec-97	0.428	0.010	<0.005	<0.005	<0.005	<0.25	0.02		<0.01	<0.5	<0.25	<0.05	<0.005	0.075	0.007	<0.02	<0.05
Durrow Convent	7-Dec-97	0.044	0.020	<0.005	<0.005	<0.005	<0.25	<0.02		<0.01	<0.5	<0.25	<0.05	<0.005	0.187	0.035	<0.02	<0.05
Emo	7-Dec-97	0.065	0.033	<0.005	<0.005	<0.005	<0.25	<0.02		<0.01	<0.5	<0.25	<0.05	<0.005	0.226	0.028	<0.02	<0.05
Errill A GWS.	7-Dec-97	0.106	0.025	<0.005	<0.005	<0.005	<0.25	<0.02		<0.01	<0.5	<0.25	<0.05	<0.005	0.295	0.027	<0.02	<0.05
Errill B Gws.	7-Dec-97	0.148	0.023	<0.005	<0.005	<0.005	<0.25	<0.02		<0.01	<0.5	<0.25	<0.05	<0.005	0.217	0.015	<0.02	<0.05
Fermoyle, Ballinakill	7-Dec-97	0.070	0.053	<0.005	<0.005	0.005	<0.25	<0.02		<0.01	<0.5	<0.25	<0.05	<0.005	0.181	0.015	<0.02	<0.05
Fermoyle, Durrow	7-Dec-97	0.083	0.050	<0.005	<0.005	0.005	<0.25	<0.02		<0.01	<0.5	<0.25	<0.05	<0.005	0.173	0.070	<0.02	<0.05
Five Wells, Abbeyleix	7-Dec-97	0.165	0.032	<0.005	<0.005	<0.005	<0.25	<0.02		<0.01	<0.5	<0.25	<0.05	<0.005	0.201	0.021	<0.02	<0.05
Killeaney GWS.	7-Dec-97	0.082	0.039	<0.005	<0.005	<0.005	<0.25	<0.02		<0.01	<0.5	<0.25	<0.05	<0.005	0.261	0.023	<0.02	<0.05
Killenard GWS.	7-Dec-97	0.027	0.069	<0.005	<0.005	0.008	<0.25	<0.02		<0.01	<0.5	<0.25	<0.05	<0.005	0.389	0.022	<0.02	<0.05
Knocks Bore, Mountrath	7-Dec-97	0.451	0.009	<0.005	<0.005	<0.005	<0.25	<0.02		<0.01	<0.5	<0.25	<0.05	<0.005	0.094	0.013	<0.02	<0.05
Knocks Springs, Mountrath	7-Dec-97	0.294	<0.005	<0.005	<0.005	<0.005	<0.25	<0.02		<0.01	<0.5	<0.25	<0.05	<0.005	0.035	0.008	<0.02	<0.05
Kyle	7-Dec-97	0.028	0.025	<0.005	<0.005	<0.005	<0.25	<0.02		<0.01	<0.5	<0.25	<0.05	<0.005	0.187	0.010	<0.02	<0.05
Lough, Ballybrittas	7-Dec-97	0.179	0.027	<0.005	<0.005	<0.005	<0.25	<0.02		<0.01	<0.5	<0.25	<0.05	<0.005	0.293	0.031	<0.02	<0.05
Lough, Portarlinton	7-Dec-97	0.105	0.021	<0.005	<0.005	0.010	<0.25	<0.02		<0.01	<0.5	<0.25	<0.05	<0.005	0.259	0.058	<0.02	<0.05
Meelick	Not sampled																	
Max Well	7-Dec-97	0.107	0.042	<0.005	<0.005	0.009	<0.25	<0.02		<0.01	<0.5	<0.25	<0.05	<0.005	0.202	0.012	<0.02	<0.05
Mountsaalem GWS.	7-Dec-97	0.409	0.008	<0.005	<0.005	0.052	<0.25	<0.02		<0.01	<0.5	<0.25	<0.05	<0.005	0.057	0.065	<0.02	<0.05
Ralish GWS.	7-Dec-97	0.110	0.028	<0.005	<0.005	<0.005	<0.25	<0.02		<0.01	<0.5	<0.25	<0.05	<0.005	0.193	0.013	<0.02	<0.05
Rathdowney WW2B	7-Dec-97	0.036	0.014	<0.005	<0.005	<0.005	<0.25	<0.02		<0.01	<0.5	<0.25	<0.05	<0.005	0.086	0.243	<0.02	<0.05
Rosenallis	7-Dec-97	0.158	0.070	<0.005	<0.005	0.005	<0.25	<0.02		<0.01	<0.5	<0.25	<0.05	<0.005	0.926	0.006	<0.02	<0.05
Roundwood GWS.	7-Dec-97	0.277	0.024	<0.005	<0.005	0.006	<0.25	<0.02		<0.01	<0.5	<0.25	<0.05	<0.005	0.196	0.020	<0.02	<0.05
Shanahoe, Ballacolla	7-Dec-97	0.144	0.017	<0.005	<0.005	<0.005	<0.25	<0.02		<0.01	<0.5	<0.25	<0.05	<0.005	0.172	0.015	<0.02	<0.05
Shanbeg, Rosenallis	7-Dec-97	0.094	0.017	<0.005	<0.005	0.023	<0.25	<0.02		<0.01	<0.5	<0.25	<0.05	<0.005	0.165	0.100	<0.02	<0.05
The Heath	Not sampled																	
The Orchard, Timahoe	7-Dec-97	0.012	0.035	<0.005	<0.005	0.008	<0.25	<0.02		<0.01	<0.5	<0.25	<0.05	<0.005	0.162	0.012	<0.02	<0.05
The Strand GWS	7-Dec-97	0.005	0.012	<0.005	<0.005	0.009	<0.25	<0.02		<0.01	<0.5	<0.25	<0.05	<0.005	0.160	0.196	<0.02	<0.05
The Swan	7-Dec-97	0.059	0.027	<0.005	<0.005	<0.005	<0.25	<0.02		<0.01	<0.5	<0.25	<0.05	<0.005	0.330	0.015	<0.02	<0.05
Tinaraheen, Ballacolla	7-Dec-97	0.121	0.032	<0.005	<0.005	<0.005	<0.25	<0.02		<0.01	<0.5	<0.25	<0.05	<0.005	0.225	0.022	<0.02	<0.05
Townspark, Borris-in-Ossory	7-Dec-97	0.180	0.058	<0.005	<0.005	0.016	<0.25	<0.02		<0.01	<0.5	<0.25	<0.05	<0.005	0.439	0.026	<0.02	<0.05
Tullore, Ballyroan	7-Dec-97	0.189	0.023	<0.005	<0.005	<0.005	<0.25	<0.02		<0.01	<0.5	<0.25	<0.05	<0.005	0.193	0.029	<0.02	<0.05

Appendix B: Results of GSI/Midland Health Board/State Laboratory Sampling and Analysis in June and July 1999

Supply Source	Date Sampling	Concentration (mg/l)																TC	E. coli
		NO3	Ca	Mg	K	Na	Cl	NO2	SO4	Alk	Hard	Cond	Al	Fe	Mn	NH4	NH4 (Co.Co)		
																		(count per 100 ml)	
Arles	14-Jul-99	33	107	7.987	13.54	21.97	42	<0.1	31.5	246	300	671	0.074	0.029	<0.005	<0.015		14	14
Attanagh GWS.	22-Jun-99	32.8	137.2	10.32	3.469	8.888	17.6	<0.1	12.7	360	385	701	0.107	<0.005	<0.005	<0.015		0	0
Aughfeerish	15-Jun-99	39	133.6	13.98	1.509	8.177	19.7	<0.1	11.9	292	391.1	611	0.101	<0.005	<0.005	<0.015		0	0
Ballinabranagh																			
Ballydavis 1	15-Jun-99	23.4	109.5	12.79	1.09	7.86	20.1	<0.1	15.5	272	326.2	561	0.086	<0.005	<0.005	0.035		0	0
Ballydavis 2	15-Jun-99	16.1	112.8	12.43	1.874	8.166	18.7	<0.1	12.5	276	332.8	545	0.094	0.007	0.12	<0.015		0	0
Ballypickas GWS																			
Barrow House	8-Jun-99	55	125.2	9.943	4.83	15.02	28	<0.1	36.5	258		680	0.1	<0.005	<0.005	<0.015		0	0
Byrnes, Borris-in-Ossory	12-Jul-99	2.9	169.6	6.4	2.213	8.07	16.1	<0.1	40	416	449.9	783	0.083	0.005	<0.005	<0.015		0	0
Cavanagh's, Borris-in-Ossory	12-Jul-99	10	105	8.823	5.938	9.554	22.7	<0.1	24.9	312	298.5	642	0.085	0.006	0.091	<0.015		0	0
Clohogue Springs, Ballinakill	22-Jun-99	32.2	118.1	16.09	3.102	8.146	18.1	<0.1	11.1	328	361	650	0.109	0.01	<0.005	<0.015		8	1
Coolenagh	14-Jul-99	11.4	106.3	14.51	1.162	8.512	15.4	<0.1	19.8	296	325.1	588	0.077	0.008	<0.005	<0.015		0 (treated)	0 (treated)
Cooffin, Ballacolla	21-Jun-99	20.5	157.7	6.778	2.436	7.686	17.9	<0.1	13.6	400	421.7	745	0.1	<0.005	<0.005	<0.015		0	0
Cullahill GWS.	22-Jun-99	42	130.9	12.61	3.65	8.39	18.4	<0.1	12.2	334	378.8	683	0.099	0.008	<0.005	<0.015		0	0
Dairyhill, Ballacolla	21-Jun-99	31.5	125.8	28.34	5.948	9.203	22.2	<0.1	13.6	400	430.8	768	0.109	<0.005	<0.005	<0.015		15	9
Darkin Well/Straboe	14-Jun-99	20.7	105.8	9.546	2.761	8.712	18.8	<0.1	14.1	258	303.4	532	0.112	0.014	<0.005	<0.015		>100	68
Derrin, Borris-in-Ossory	12-Jul-99	23.1	116	6.009	1.433	8.366	16.9	<0.1	10.3	346	314.4	672	0.079	0.019	<0.005	<0.015		1	1
Derryguile	14-Jun-99	24.9	115.6	18.27	1.492	13.54	19.4	<0.1	24.3	328	363.9	659	0.105	0.17	<0.005	0.133		0	0
Donaghmore GWS.	21-Jun-99	3.1	95.56	27.27	1.262	8.479	16.6	<0.1	25.4	328	350.9	616	0.115	0.015	<0.005	<0.015		0	0
Drim, Mountrath	28-Jun-99	7.2	46.8	8.451	1.855	7.863	10.2	<0.1	4.5	146	151.7	302	0.069	<0.005	<0.005	<0.015		0	0
Durrow Convent	22-Jun-99	37.5	116.9	15.97	2.017	8.234	20.1	<0.1	14.6	314	357.6	652	0.1	0.008	<0.005	<0.015		0	0
Emo																			
Errill A GWS.	12-Jul-99	13.6	47.4	22.41	1.77	8.048	18	<0.1	18.5	190	210.6	429	0.083	0.011	<0.005	<0.015		0	0
Errill B Gws.	12-Jul-99	21.1	92	10.78	2.513	8.076	19.4	<0.1	13.2	278	274.1	580	0.08	<0.005	<0.005	<0.015		3	2
Fermoyle, Ballinakill	22-Jun-99	44.2	132	18.56	3.482	9.721	23.3	<0.1	27.8	340	406.1	731	0.111	0.006	<0.005	<0.015		0	0
Fermoyle, Durrow	22-Jun-99	42.5	126	19.68	2.467	9.222	24.9	<0.1	23.5	334	395.6	715	0.111	0.012	<0.005	<0.015		0	0
Five Wells, Abbeyleix	15-Jun-99	31.1	138.1	14.84	2.208	8.453	16.3	<0.1	13.6	358	406	685	0.102	0.006	<0.005	<0.015		2	2
Killeaney GWS.	28-Jun-99	58	141.9	18.53	2.174	9.37	22.8	<0.1	13.6	370	430.5	770	0.103	<0.005	<0.005	<0.015	>18 (treated)	14 (treated)	
Killenard GWS.	8-Jun-99	33.7	148.4	9.065	2.322	11.18	21.4	<0.1	20.5	362		727	0.094	<0.005	<0.005	<0.015		25	6
Knocks Bore, Mountrath	28-Jun-99	10.1	56.98	3.164	1.368	6.176	11.4	<0.1	6.9	142	155.3	307	0.072	0.012	<0.005	<0.015		0	0
Knocks Springs, Mountrath	28-Jun-99	2.6	23.1	3.702	0.97	5.732	8.4	<0.1	3.3	66	72.92	158	0.07	0.253	0.079	<0.015		>100	>100
Kyle	8-Jun-99	19.6	112.8	10.14	1.278	7.337	16	<0.1	10.8	286		565	0.082	0.006	<0.005	<0.015		>100	>100
Lough, Ballybrittas	8-Jun-99	19.3	135.8	11.87	3.412	11.74	23.3	<0.1	29.1	342		702	0.088	0.011	0.049	<0.015		0	0
Lough, Portarlinton	8-Jun-99	25.6	132.7	7.55	1.656	10.93	22.8	<0.1	24.3	330		685	0.097	0.021	<0.005	<0.015		0	0
Max Well	15-Jun-99	25.5	135.6	12.96	1.254	8.164	16.7	<0.1	13.5	312	392.1	613	0.101	<0.005	<0.005	<0.015		0	0
Meelick	12-Jun-99	19	131.8	12.87	2.907	9.751	17.3	<0.1	16.4	346	382.2	659	0.108	0.008	<0.005	<0.015		0	0
Mountsaleam GWS.	28-Jun-99	14.6	36.36	5.906	1.127	7.286	11.5	<0.1	5.6	100	115.1	245	0.077	0.006	<0.005	<0.015		3	0
Ralish GWS.	22-Jun-99	34	135.3	14.63	1.422	7.889	19.6	<0.1	12.7	354	398.1	701	0.089	<0.005	<0.005	<0.015		0	0
Rathdowney WW2B	21-Jun-99	25.7	103.9	30.16	1.079	6.503	15.5	<0.1	11.5	356	383.7	665	0.114	<0.005	<0.005	<0.015		0	0
Rosenallis	14-Jun-99	0.6	84.77	31.24	5.388	19.82	26	<0.1	32.4	324	340.3	643	0.11	0.054	0.005	<0.015		0	0
Roundwood GWS.	28-Jun-99	11.7	123.3	5.483	5.531	5.777	7.1	<0.1	12.2	322	330.5	585	0.097	0.006	<0.005	<0.015		0	0
Shanahoe, Ballacolla	21-Jun-99	45	112.3	27.1	3.648	8.974	22.1	<0.1	20.2	336	392.1	709	0.114	<0.005	<0.005	<0.015		0	0
Shanbeg, Rosenallis	14-Jun-99	14.7	129.8	15.9	5.624	11.51	16	<0.1	12.8	380	389.5	696	0.102	<0.005	<0.005	<0.015		0	0
The Heath	14-Jun-99	21.1	114.8	11.57	1.067	7.636	19.1	<0.1	14.3	280	334.2	570	0.104	<0.005	<0.005	<0.015		7	4
The Orchard, Timahoe	8-Jun-99	12.7	102.2	6.242	1.513	7.299	12.4	<0.1	8.5	260		504	0.069	<0.005	<0.005	<0.015		>100	>100
The Strand GWS	14-Jul-99	0.2	89.37	18.07	1.235	15.24	13.2	<0.1	9.4	304	297.6	557	0.086	0.01	<0.005	<0.015		0 (treated)	0 (treated)
The Swan	8-Jun-99	<0.1	47.16	26.62	3.575	22.04	8.7	<0.1	29.7	240		464	0.085	0.162	0.17	0.113		0	0
Timaraheen, Ballacolla	21-Jun-99	31.3	137.8	21.59	2.862	10.16	22.4	<0.1	36.5	376	433	769	0.114	<0.005	<0.005	<0.015		8	7
Townspark, Borris-in-Ossory	12-Jul-99	7.7	148.5	7.681	2.391	15.3	18.9	<0.1	31.8	390	402.5	743	0.084	0.008	<0.005	<0.015		0	0
Tullore, Ballyroan	15-Jun-99	27.2	123.6	11.56	2.046	7.992	16.3	<0.1	12.8	318	356.3	625	0.09	<0.005	<0.005	<0.015		0	0

NB - Confusion in lab certs over Errill A & B sources. Addressed using Cl, NO3, and EC data, as compared with Nov 97

NB - Confusion in lab certs over Fermoyle, Durrow and Ballinakill sources. Addressed using Cl, NO3, and EC data, as compared with Nov 97

NB - Assume Derryguile=Mountmeelick

Appendix B: Results of GSI/Midland Health Board/State Laboratory Sampling and Analysis in June and July 1999

Supply Source	Date Sampling	Concentration (mg/l)																
		Ba	B	Cd	Cr	Cu	F	Pb	Hg	Ni	PO4	P	Se	Ag	Sr	Zn	Ant	As
Aries	14-Jul-99	0.013	<0.005	<0.005	<0.005	0.068	<0.25	<0.02	0	<0.01	0	<0.25	<0.05	0	0.175	0.06	<0.02	<0.05
Attanagh GWS.	22-Jun-99	0.054	0.03	<0.005	<0.005	0.016	<0.25	<0.02	0	<0.01	0	<0.25	<0.05	<0.005	0.208	2.125	<0.02	<0.05
Aughfeerish	15-Jun-99	0.09	0.039	<0.005	<0.005	0.005	<0.25	<0.02	0	<0.01	0	<0.25	<0.05	<0.005	0.185	0.007	<0.02	<0.05
Ballinabranagh																		
Ballydavis 1	15-Jun-99	0.045	0.016	<0.005	<0.005	0.015	<0.25	<0.02	0	<0.01	0	<0.25	<0.05	<0.005	0.197	0.04	<0.02	<0.05
Ballydavis 2	15-Jun-99	0.069	0.012	0.008	<0.005	0.01	<0.25	<0.02	0	0.015	0	<0.25	<0.05	<0.005	0.191	0.041	<0.02	<0.05
Ballypickas GWS																		
Barrow House	8-Jun-99	0.039	0.15	<0.005	<0.005	0.007	<0.25	<0.02	<0.005	<0.01		<0.25		<0.005	0.171	0.027	<0.02	<0.05
Byrnes, Borris-in-Ossory	12-Jul-99	0.177	<0.005	<0.005	<0.005	0.02	<0.25	<0.02		<0.01		<0.25	0.064		0.365	0.014	<0.02	<0.05
Cavanagh's, Borris-in-Ossory	12-Jul-99	0.162	<0.005	<0.005	<0.005	0.018	<0.25	<0.02		<0.01		<0.25	<0.05		0.402	0.027	<0.02	<0.05
Clohogue Springs, Ballinakill	22-Jun-99	0.12	0.02	<0.005	<0.005	0.009	<0.25	<0.02	0	<0.01	0	<0.25	<0.05	<0.005	0.179	0.014	<0.02	<0.05
Coolenagh	14-Jul-99	0.006	<0.005	<0.005	<0.005	0.023	<0.25	<0.02	0	<0.01	0	<0.25	<0.05	0	0.172	0.108	<0.02	<0.05
Coolfin, Ballacolla	21-Jun-99	0.103	0.041	<0.005	<0.005	0.009	<0.25	<0.02	0	<0.01	0	<0.25	<0.05	<0.005	0.296	0.012	<0.02	<0.05
Cullahill GWS.	22-Jun-99	0.039	0.038	<0.005	<0.005	0.01	<0.25	<0.02	0	<0.01	0	<0.25	<0.05	<0.005	0.171	0.014	<0.02	<0.05
Dairyhill, Ballacolla	21-Jun-99	0.083	0.068	<0.005	<0.005	0.016	<0.25	<0.02	0	<0.01	0	<0.25	0.053	<0.005	0.17	0.013	<0.02	<0.05
Darkin Well/Straboe	14-Jun-99	0.044	0.02	<0.005	<0.005	0.009	<0.25	<0.02	0	<0.01	0	<0.25	<0.05	<0.005	0.165	0.049	<0.02	<0.05
Derrin, Borris-in-Ossory	12-Jul-99	0.093	<0.005	<0.005	<0.005	0.014	<0.25	<0.02	0	<0.01	0	<0.25	0.059	0	0.308	0.024	<0.02	<0.05
Derryguile	14-Jun-99	0.148	0.124	<0.005	<0.005	0.006	<0.25	<0.02	0	<0.01	0	<0.25	<0.05	<0.005	3.787	0.033	<0.02	<0.05
Donaghmore GWS.	21-Jun-99	0.052	0.042	<0.005	<0.005	0.009	0.36	<0.02	0	<0.01	0	<0.25	<0.05	<0.005	0.884	0.027	<0.02	<0.05
Drim, Mountrath	28-Jun-99	0.3	0.016	<0.005	<0.005	0.01	<0.25	<0.02	<0.005	<0.01		<0.25	<0.05	<0.005	0.116	0.008	<0.02	<0.05
Durrow Convent	22-Jun-99	0.046	0.024	<0.005	<0.005	0.013	<0.25	<0.02	0	<0.01	0	<0.25	<0.05	<0.005	0.187	0.021	<0.02	<0.05
Emo																		
Errill A GWS.	12-Jul-99	0.1	<0.005	<0.005	<0.005	0.02	0.26	<0.02		<0.01		<0.25	0.055		0.353	0.031	<0.02	<0.05
Errill B Gws.	12-Jul-99	0.121	<0.005	<0.005	<0.005	0.014	<0.25	<0.02		<0.01		<0.25	0.063		0.213	0.03	<0.02	<0.05
Fermoyle, Ballinakill	22-Jun-99	0.076	0.059	<0.005	<0.005	0.022	<0.25	<0.02	0	<0.01	0	<0.25	<0.05	<0.005	0.171	0.015	<0.02	<0.05
Fermoyle, Durrow	22-Jun-99	0.081	0.067	<0.005	<0.005	0.015	<0.25	<0.02	0	<0.01	0	<0.25	<0.05	<0.005	0.16	0.023	<0.02	<0.05
Five Wells, Abbeyleix	15-Jun-99	0.169	0.052	0.007	<0.005	0.013	<0.25	<0.02	<0.005	<0.01	0	<0.25	<0.05	<0.005	0.196	0.043	<0.02	<0.05
Killeaney GWS.	28-Jun-99	0.085	0.028	<0.005	<0.005	0.023	<0.25	<0.02	0	<0.01	0	<0.25	<0.05	<0.005	0.239	0.021	<0.02	<0.05
Killenard GWS.	8-Jun-99	0.025	0.079	<0.005	<0.005	0.012	<0.25	<0.02	<0.005	<0.01		<0.25	<0.05	<0.005	0.416	0.013	<0.02	<0.05
Knocks Bore, Mountrath	28-Jun-99	0.468	0.011	<0.005	<0.005	0.009	<0.25	<0.02	<0.005	<0.01		<0.25	<0.05	<0.005	0.09	0.011	<0.02	<0.05
Knocks Springs, Mountrath	28-Jun-99	0.39	0.009	<0.005	<0.005	0.009	<0.25	<0.02	<0.005	<0.01		<0.25	<0.05	<0.005	0.043	0.009	<0.02	<0.05
Kyle	8-Jun-99	0.027	0.024	<0.005	<0.005	<0.005	<0.25	<0.02	<0.005	<0.01		<0.25	<0.05	<0.005	0.185	0.032	<0.02	<0.05
Lough, Ballybrittas	8-Jun-99	0.184	0.034	<0.005	<0.005	0.011	<0.25	<0.02	<0.005	<0.01		<0.25	<0.05	<0.005	0.276	0.024	<0.02	<0.05
Lough, Portarlinton	8-Jun-99	0.11	0.029	<0.005	<0.005	0.009	1.1	<0.02	<0.005	<0.01		<0.25	<0.05	<0.005	0.256	0.024	<0.02	<0.05
Max Well	15-Jun-99	0.111	0.028	<0.005	<0.005	0.006	<0.25	<0.02	0	<0.01	0	<0.25	<0.05	<0.005	0.196	0.011	<0.02	<0.05
Meelick	12-Jun-99	0.092	0.039	<0.005	<0.005	0.007	<0.25	<0.02	0	<0.01	0	<0.25	<0.05	<0.005	0.245	0.016	<0.02	<0.05
Mountsaalem GWS.	28-Jun-99	0.396	0.015	<0.005	<0.005	0.053	<0.25	<0.02	0	<0.01	0	<0.25	<0.05	<0.005	0.05	0.054	<0.02	<0.05
Ralish GWS.	22-Jun-99	0.118	0.036	<0.005	<0.005	0.012	<0.25	<0.02	0	<0.01	0	<0.25	0.054	<0.005	0.195	0.019	<0.02	<0.05
Rathdowney WW2B	21-Jun-99	0.033	0.024	<0.005	<0.005	0.017	<0.25	<0.02	0	<0.01	0	<0.25	<0.05	<0.005	0.086	0.147	<0.02	<0.05
Rosenallis	14-Jun-99	0.151	0.077	<0.005	<0.005	0.042	<0.25	<0.02	0	<0.01	0	<0.25	<0.05	<0.005	0.937	0.08	<0.02	<0.05
Roundwood GWS.	28-Jun-99	0.266	0.021	<0.005	<0.005	0.016	<0.25	<0.02	0	<0.01	0	<0.25	<0.05	<0.005	0.188	0.014	<0.02	<0.05
Shanhoe, Ballacolla	21-Jun-99	0.146	0.041	<0.005	<0.005	0.013	<0.25	<0.02	0	<0.01	0	<0.25	<0.05	<0.005	0.161	0.013	<0.02	<0.05
Shanbeg, Rosenallis	14-Jun-99	0.118	0.02	<0.005	<0.005	0.023	<0.25	<0.02	0	<0.01	0	<0.25	<0.05	<0.005	0.179	0.032	<0.02	<0.05
The Heath	14-Jun-99	0.02	0.018	<0.005	<0.005	<0.005	<0.25	<0.02	0	<0.01	0	<0.25	<0.05	<0.005	0.22	0.016	<0.02	<0.05
The Orchard, Timahoe	8-Jun-99	0.01	0.016	<0.005	<0.005	0.006	<0.25	<0.02	<0.005	<0.01		<0.25	<0.05	<0.005	0.153	0.016	<0.02	<0.05
The Strand GWS	14-Jul-99	0.018	<0.005	<0.005	<0.005	0.022	<0.25	<0.02		<0.01		<0.25	<0.05		0.162	0.043	<0.02	<0.05
The Swan	8-Jun-99	0.065	0.032	<0.005	<0.005	<0.005	<0.25	<0.02	<0.005	<0.01		<0.25	<0.05	<0.005	0.334	0.011	<0.02	<0.05
Tinaraheen, Ballacolla	21-Jun-99	0.111	0.037	<0.005	<0.005	0.011	<0.25	<0.02	0	<0.01	0	<0.25	<0.05	<0.005	0.207	0.012	<0.02	<0.05
Townspark, Borris-in-Ossory	12-Jul-99	0.16	0.046	<0.005	<0.005	0.034	<0.25	<0.02	0	<0.01	0	<0.25	0.059	0	1.154	0.025	<0.02	<0.05
Tullore, Ballyroan	15-Jun-99	0.195	0.025	<0.005	<0.005	<0.005	<0.25	<0.02	0	<0.01	0	<0.25	<0.05	<0.005	0.191	0.006	<0.02	<0.05

NB - Confusion in lab certs over Errill A & B sources. Addressee

NB - Confusion in lab certs over Fermoyle, Durrow and Ballinakill

NB - Assume Derryguile=Mountmeelick

APPENDIX C

Appendix C: Co Laois Sanitary Authority 1997 Returns to the EPA

LS	NAME OF WATER SUPPLY	CAT	SAMPLE LD.	YEAR	DAY/MO	TIME	T COLI	F COLI	RES CL	COLOUR	TURB - J	TURB - S	ODOUR	TASTE	TEMP	pH	COND1	COND2	Clide	SO4	Ca	Mg	Na	K	Al	Dry R	NO3	NO2	NH4	KJ N	Oxid	H2S	SEC	HCBN	PhOH	B	SURF	ORGC1	Fe	Mn	
LS	Attanagh GWS	GWS	See report	1997	10-Feb	10.15		0	0		0.1		None			6.7	639								<0.01	77.8	<0.01														
LS	Attanagh GWS	GWS	See report	1997	24-Mar			0	0																																
LS	Attanagh GWS	GWS	See report	1997	4-Jun			0	0																																
LS	Attanagh GWS	GWS	See report	1997	29-Sep	14.25	2	0		6	0.1		None			7.2	703		21								59.2	<0.01	<0.02		0.1									31	
LS	Attanagh GWS	GWS	See report	1997	4-Nov		14	0																																	
LS	Ballinabranagh GWS	GWS	See report	1997	13-Jan			0	0		3	0.1	None			7.3	539		17					0.01		3.3	<0.01	0.04		<0.1										10	
LS	Ballinabranagh GWS	GWS	See report	1997	24-Mar			0	0																																
LS	Ballinabranagh GWS	GWS	See report	1997	9-Apr			0	0																																
LS	Ballinabranagh GWS	GWS	See report	1997	26-May			0	0																																
LS	Ballinabranagh GWS	GWS	See report	1997	9-Jun	10.00	1	1		2	0.1		None			6.3																									
LS	Ballinabranagh GWS	GWS	See report	1997	9-Sep			0	0																																
LS	Ballinabranagh GWS	GWS	See report	1997	15-Sep			0	0		4	34	None			7.5	529		19								4.2	0.02	0.03		<0.1									723	
LS	Ballybrittas GWS	GWS	See report	1997	13-Jan			0	0		4	0.1	None			7.1	678							<0.01																	
LS	Ballybrittas GWS	GWS	See report	1997	17-Feb			0	0																																
LS	Ballybrittas GWS	GWS	See report	1997	24-Mar	13.00	0	0		1	0.2		None			6.8	613		23					0.02		13	0.04	0.03		0.3										30	
LS	Ballybrittas GWS	GWS	See report	1997	21-Apr			0	0																																
LS	Ballybrittas GWS	GWS	See report	1997	21-May			0	0																																
LS	Ballybrittas GWS	GWS	See report	1997	23-Jun			0	0																																
LS	Ballybrittas GWS	GWS	See report	1997	15-Jul			0	0																																
LS	Ballybrittas GWS	GWS	See report	1997	11-Aug	11.00	0	0		7	0.2		None			7.1	678		27								17.5	0.02	<0.02		0.4									48	
LS	Ballybrittas GWS	GWS	See report	1997	29-Sep		2	2																																	
LS	Ballybrittas GWS	GWS	See report	1997	6-Oct			0	0																																
LS	Ballybrittas GWS	GWS	See report	1997	29-Oct			0	0																																
LS	Ballybrittas GWS	GWS	See report	1997	19-Nov			0	0																																
LS	Ballybrittas GWS	GWS	See report	1997	1-Dec			0	0	0.1	2	0.4	Chlorine			7.1	706																								
LS	Barrowhouse GWS	GWS	See report	1997	9-Jun	11.30	0	0		4	0.3		None			6.1											64.5	<0.01													
LS	Barrowhouse GWS	GWS	See report	1997	4-Nov			0	0																																
LS	Coolfin/Ballacolla GWS	GWS	See report	1997	10-Feb	10.30	0	0					None			7	652		21					0.01		37	<0.01	<0.02		0.2									<20		
LS	Coolfin/Ballacolla GWS	GWS	See report	1997	19-May		10	0																																	
LS	Coolfin/Ballacolla GWS	GWS	See report	1997	25-Aug	11.40	8	4		6	0.4		None			7.1	669																								
LS	Cullahill GWS	GWS	See report	1997	10-Feb																						46.5	<0.01													
LS	Cullahill GWS	GWS	See report	1997	24-Mar		1	1		1	0.1		None			7.1	625		20					<0.01		52	0.05	0.04		0.1									<20		
LS	Cullahill GWS	GWS	See report	1997	9-Apr		0	0																																	
LS	Cullahill GWS	GWS	See report	1997	9-Jun	9.30	19	10		1	0.2		None			6.4																									
LS	Cullahill GWS	GWS	See report	1997	11-Jun		50	16																																	
LS	Cullahill GWS	GWS	See report	1997	16-Jun		3	4																																	
LS	Cullahill GWS	GWS	See report	1997	29-Sep	14.10	0	0		6	0.1		None			7.4	653		19								40.4	<0.01	<0.02		0.2									32	
LS	Cullahill GWS	GWS	See report	1997	1-Dec			0	0		3	0.4	None			7.1	767																								
LS	Dairyhill/Ballacolla GWS	GWS	See report	1997	10-Feb	10.50	0	0					None			7.2	759		24						0.01		41.6	<0.01	0.02		0.2								<20		
LS	Dairyhill/Ballacolla GWS	GWS	See report	1997	13-May		8	2																																	
LS	Dairyhill/Ballacolla GWS	GWS	See report	1997	25-Aug	11.55	88	7		5	0.3		None			7.3	735																								
LS	Derrymalogue GWS	GWS	See report	1997	27-Jan		0	0																																	
LS	Donaghmore GWS	GWS	See report	1997	19-May	10.25	0	0		2	0.2		None			6.3			18								4.7	<0.01	0.04		<0.1								<20		
LS	Donaghmore GWS	GWS	See report	1997	13-Oct	11.15	2	0		3	0.2		None			7.3	624																								
LS	Errill GWS	GWS	See report	1997	6-Jan	10.40	0	0		1	0.1		None			7.1	654							<0.01																	
LS	Errill GWS	GWS	See report	1997	19-Feb		0	0																																	
LS	Errill GWS	GWS	See report	1997	12-Mar		0	0																																	
LS	Errill GWS	GWS	See report	1997	21-Apr		0	0																																	
LS	Errill GWS	GWS	See report	1997	19-May	11.15	0	0		5	0.1		None			6.3			23								48.5	<0.01	0.04		0.1							<20			
LS	Errill GWS	GWS	See report	1997	30-Jun		0	0																																	
LS	Errill GWS	GWS	See report	1997	28-Jul	10.35	Innum	36		6	0.5		None			7.1	673																								
LS	Errill GWS	GWS	See report	1997	30-Jul		>100	4																																	
LS	Errill GWS	GWS	See report	1997	5-Aug		>100	84																																	
LS	Errill GWS	GWS	See report	1997	25-Aug		0	0																																	
LS	Errill GWS	GWS	See report	1997	25-Aug		0	0																																	
LS	Errill GWS	GWS	See report	1997	2-Sep	10.00	22	12	<0.02	7	0.6		SI antisept			7.3	687		20								21.7	0.29	<0.02		0.2								26		
LS	Errill GWS	GWS	See report	1997	8-Sep		0	0																																	
LS	Errill GWS	GWS	See report	1997	23-Sep		0	0																																	
LS	Errill GWS	GWS	See report	1997	20-Oct	10.10	6	6		2	0.1		None			7	706		22																						

Appendix C: Co Laois Sanitary Authority 1997 Returns to the EPA

SA	NAME OF WATER SUPPLY	CAT	SAMPLE LD.	YEAR	DAY/MO	TIME	T COLI	F COLI	RES CL	COLOUR	TURB - J	TURB - S	ODOUR	TASTE	TEMP	pH	COND1	COND2	Clide	SO4	Ca	Mg	Na	K	Al	Dry R	NO3	NO2	NH4	KJ N	Oxid	H2S	SEC	HCBN	PhOH	B	SURF	ORGC1	Fe	Mn	
LS	Mountsalem GWS	GWS	See report	1997	29-Sep	9.45	1	0			3	0.2		None		6.6	268																								
LS	Mountsalem GWS	GWS	See report	1997	5-Nov		14	2																																	
LS	Raheen GWS	GWS	See report	1997	27-Jan		0	0																																	
LS	Raheen GWS	GWS	See report	1997	26-May	10.30	1	1			1	0.8		None		6.2				23							40	<0.01	<0.01		0.1									26	
LS	Raheen GWS	GWS	See report	1997	9-Jun		3	3																																	
LS	Raheen GWS	GWS	See report	1997	24-Jun		9	2																																	
LS	Ralish GWS	GWS	See report	1997	28-Apr		0	0																																	
LS	Ralish GWS	GWS	See report	1997	19-May	10.00	4	0			2	0.1		None		6.3																									
LS	Ralish GWS	GWS	See report	1997	3-Jun		0	0																																	
LS	Ralish GWS	GWS	See report	1997	20-Oct	11.00	0	0			6	0.1		None		7.1	672			20							22.6	0.07	0.05		0.1									32	
LS	Ratheniska GWS	GWS	See report	1997	19-May	15.30	0	0			2	0.2		None		6.4																									
LS	Ratheniska GWS	GWS	See report	1997	1-Dec	12.25	0	0	0.1		2	0.3		Chlorine		7.5	588																								
LS	Roundwood GWS	GWS	See report	1997	6-Jan		0	0																																	
LS	Roundwood GWS	GWS	See report	1997	9-Jun		2	0																																	
LS	Roundwood GWS	GWS	See report	1997	29-Sep	10.00	1	0			6	0.1		None		7	578																								
LS	Roundwood GWS	GWS	See report	1997	5-Nov		2	0																																	
LS	Shanahoe/Ballacolla GWS	GWS	See report	1997	10-Feb	11.10	0	0						None		7	706			25					0.01		52.3	<0.01	0.02		0.2									20	
LS	Shanahoe/Ballacolla GWS	GWS	See report	1997	10-Feb	11.00	0	0						None		7.1	708			26					0.01		46.7	<0.01	<0.02		0.1									<20	
LS	Shanahoe/Ballacolla GWS	GWS	See report	1997	13-May		0	0																																	
LS	Shanahoe/Ballacolla GWS	GWS	See report	1997	11-Aug	10.10	21	5			7	0.4		None		7.2	669																								
LS	The Heath	GWS	See report	1997	9-Jul		14	6																																	
LS	The Heath	GWS	See report	1997	16-Jul		0	0																																	
LS	The Heath GWS	GWS	See report	1997	11-Feb		8	0																																	
LS	The Heath GWS	GWS	See report	1997	17-Feb		10	0																																	
LS	The Heath GWS	GWS	See report	1997	24-Mar		0	0			1	0.1		None		7	542			16					0.01		17.8	<0.01	0.03		<0.1								20		
LS	The Heath GWS	GWS	See report	1997	21-Apr		0	0																																	
LS	The Heath GWS	GWS	See report	1997	26-May		0	0																																	
LS	The Heath GWS	GWS	See report	1997	10-Jun		6	3																																	
LS	The Heath GWS	GWS	See report	1997	23-Jun		0	0																																	
LS	The Heath GWS	GWS	See report	1997	29-Sep	14.00	0	0			4	0.3		None		7.4	570			18							21.5	<0.01	<0.02		<0.1									29	
LS	The Heath GWS	GWS	See report	1997	29-Oct		0	0																																	
LS	The Heath GWS	GWS	See report	1997	10-Nov		0	0																																	
LS	The Heath GWS	GWS	See report	1997	17-Dec		0	0																																	
LS	Tinraheen/Ballacolla GWS	GWS	See report	1997	13-May		14	8																																	

Appendix C: Co Laois Sanitary Authority 1997 Returns to the EPA.

SA	NAME OF WATER SUPPLY	CAT	SAMPLE LD.	YEAR	DAY/MO	TIME	T COLI	F COLI	RES CL	COLOUR	TURB - J	TURB - S	ODOUR	TASTE	TEMP	pH	COND1	COND2	CTide	SO4	Ca	Mg	Na	K	Al	Dry R	NO3	NO2	NH4	Kj N	Oxid	H2S	SEC	HCBN	PhOH	B	SURF	ORGL	Fe	Mn				
LS	Ballyroan	PWS	See report	1997	29-Apr		0	0																																				
LS	Ballyroan	PWS	See report	1997	19-May	10.30	0	0			2	0.1		None		6.4				20							29	<0.01	0.03		0.1											<20		
LS	Ballyroan	PWS	See report	1997	16-Jun		0	0																																				
LS	Ballyroan	PWS	See report	1997	7-Jul		0	0																																				
LS	Ballyroan	PWS	See report	1997	18-Aug	10.30	0	0			6	0.2		None		7.3	589																											
LS	Ballyroan	PWS	See report	1997	8-Sep		0	0																																				
LS	Ballyroan	PWS	See report	1997	29-Sep		0	0																																				
LS	Ballyroan	PWS	See report	1997	28-Oct		0	0																																				
LS	Ballyroan	PWS	See report	1997	11-Nov		0	0																																				
LS	Ballyroan	PWS	See report	1997	8-Dec	10.00	0	0			1	0.1		None		7.5	625		24								21.3	0.03	0.02		0.1											34		
LS	Borris-in-Ossory	PWS	See report	1997	19-Feb		0	0																																				
LS	Borris-in-Ossory	PWS	See report	1997	12-Mar		0	0																																				
LS	Borris-in-Ossory	PWS	See report	1997	21-Apr	10.25	0	0			2	0.7		None		6.2	764																											
LS	Borris-in-Ossory	PWS	See report	1997	30-Jun		0	0																																				
LS	Borris-in-Ossory	PWS	See report	1997	28-Jul	10.15	0	0			9	0.2		None		7	789		13								10.5	<0.01	0.06		0.7											31		
LS	Borris-in-Ossory	PWS	See report	1997	24-Sep		0	0																																				
LS	Borris-in-Ossory	PWS	See report	1997	13-Oct	11.00	0	0			4	0.5		None		7.1	763																											
LS	Borris-in-Ossory	PWS	See report	1997	13-Oct		0	0																																				
LS	Borris-in-Ossory	PWS	See report	1997	27-Nov		0	0																																				
LS	Borris-in-Ossory	PWS	See report	1997	18-Dec		0	0																																				
LS	Clonaslee	PWS	See report	1997	13-Jan		0	0			1	6.8		None		7.3	324		14								7.4	<0.01	<0.02		2.8											420		
LS	Clonaslee	PWS	See report	1997	24-Mar		0	0																																				
LS	Clonaslee	PWS	See report	1997	21-Apr	11.00	0	0			1	0.4		None		6.6	398																											
LS	Clonaslee	PWS	See report	1997	10-Jun	11.30																																						
LS	Clonaslee	PWS	See report	1997	10-Jun		2	0																																				
LS	Clonaslee	PWS	See report	1997	28-Jul	12.10	0	0			4	0.4		None		7.4	355		14								6.7	<0.01	0.04		0.5											28		
LS	Clonaslee	PWS	See report	1997	30-Sep		0	0																																				
LS	Clonaslee	PWS	See report	1997	20-Oct	14.00	0	0			5	0.7		None		7.1	287																											
LS	Clonaslee	PWS	See report	1997	17-Dec		2	0																																				
LS	Clonaslee	PWS	See report	1997	6-May		0	0																																				
LS	Coolenagh	PWS	See report	1997	24-Jun		0	0																																				
LS	Coolenagh	PWS	See report	1997	4-Nov		0	0																																				
LS	Durrow	PWS	See report	1997	13-Jan		0	0			2	0.2		None		7.1	736										0.01	58.3	<0.01															
LS	Durrow	PWS	See report	1997	13-Jan		0	0			5	0.2		None		7.5	634										0.01	45.1	<0.01															
LS	Durrow	PWS	See report	1997	5-Feb		0	0																																				
LS	Durrow	PWS	See report	1997	5-Feb		0	0																																				
LS	Durrow	PWS	See report	1997	24-Mar		0	0																																				
LS	Durrow	PWS	See report	1997	24-Mar		0	0																																				
LS	Durrow	PWS	See report	1997	29-Apr		0	0																																				
LS	Durrow	PWS	See report	1997	29-Apr		0	0																																				
LS	Durrow	PWS	See report	1997	26-May	14.15	0	0	0.25		1	0.3		Sl chlor		6.2			30								43	<0.01	0.02		<0.1												28	
LS	Durrow	PWS	See report	1997	26-May	14.20	0	0			3	0.1		None		6.7			21								44.2	<0.01	<0.02		<0.1											<20		
LS	Durrow	PWS	See report	1997	25-Jun		0	0																																				
LS	Durrow	PWS	See report	1997	25-Jun		0	0																																				
LS	Durrow	PWS	See report	1997	28-Jul	11.45	0	0	0.25		5	0.5		Chlorine		7.2	749																											
LS	Durrow	PWS	See report	1997	28-Jul	11.35	0	0			5	0.2		None		7.7	624																											
LS	Durrow	PWS	See report	1997	17-Sep		0	0																																				
LS	Durrow	PWS	See report	1997	17-Sep		0	0																																				
LS	Durrow	PWS	See report	1997	20-Oct		0	0			6	0.2		None		7.1	737		26								49.9	0.06	0.04		0.1											32		
LS	Durrow	PWS	See report	1997	20-Oct	11.05	0	0			2	0.3		None		7.5	628		22								38.6	<0.05	<0.02		0.5											25		
LS	Durrow	PWS	See report	1997	27-Nov		0	0																																				
LS	Durrow	PWS	See report	1997	27-Nov		0	0																																				
LS	Durrow	PWS	See report	1997	15-Dec		0	0																																				
LS	Durrow	PWS	See report	1997	15-Dec		0	0																																				
LS	Emo	PWS	See report	1997	21-Jan		0	0																																				
LS	Emo	PWS	See report	1997	17-Feb																																							

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SA	NAME OF WATER SUPPLY	CAT	SAMPLE LD.	YEAR	DAY/MO	TIME	T COLI	F COLI	RES CL	COLOUR	TURB - J	TURB - S	ODOUR	TASTE	TEMP	pH	COND1	COND2	CTIde	SO4	Ca	Mg	Na	K	Al	Dry R	NO3	NO2	NH4	Kj N	Oxid	H2S	SEC	HCBN	PhOH	B	SURF	ORGI	Fe	Mn				
LS	Mountmellick	PWS	See report	1997	8-Oct			0	0																																			
LS	Mountmellick	PWS	See report	1997	17-Nov	14.00	0	0		68	0.9		None			7.1	151																											
LS	Mountmellick	PWS	See report	1997	8-Dec	14.30	0	0		30	0.7		None			7.4	166		15							2.2	0.04	0.02		4										250				
LS	Mountrath	PWS	See report	1997	13-Jan			0	0																																			
LS	Mountrath	PWS	See report	1997	13-Jan			0	0																																			
LS	Mountrath	PWS	See report	1997	17-Feb	11.30	0	0			0.7		None			7.3	200																											
LS	Mountrath	PWS	See report	1997	17-Feb	11.00	0	0			1.3		None			7.1	284																											
LS	Mountrath	PWS	See report	1997	11-Mar			0	0																																			
LS	Mountrath	PWS	See report	1997	11-Mar			0	0																																			
LS	Mountrath	PWS	See report	1997	7-Apr			0	0																																			
LS	Mountrath	PWS	See report	1997	7-Apr			0	0																																			
LS	Mountrath	PWS	See report	1997	19-May	11.50	77	56		72	4.4		Sl veget			5.4			12								6.3	0.03	0.04		7.4									444				
LS	Mountrath	PWS	See report	1997	19-May	11.55	0	0		10	0.4		None			6.2			12								3.1	<0.01	<0.02		1.5									35				
LS	Mountrath	PWS	See report	1997	26-May	9.20	60	56																																				
LS	Mountrath	PWS	See report	1997	9-Jun	11.35	0	0		52	1.4		None			5.5																												
LS	Mountrath	PWS	See report	1997	9-Jun			0	0																																			
LS	Mountrath	PWS	See report	1997	30-Jun			0	0																																			
LS	Mountrath	PWS	See report	1997	30-Jul			0	0																																			
LS	Mountrath	PWS	See report	1997	30-Jul			0	0																																			
LS	Mountrath	PWS	See report	1997	29-Sep			0	0																																			
LS	Mountrath	PWS	See report	1997	29-Sep			0	0																																			
LS	Mountrath	PWS	See report	1997	13-Oct	12.00	0	0	0.3	1	0.2		Chlorine			6.9	278																											
LS	Mountrath	PWS	See report	1997	13-Oct	12.10	0	0		32	0.8		None			7.1	176																											
LS	Mountrath	PWS	See report	1997	10-Nov	11.35	0	0		15	0.2		None			7.1	177		15								2.7	0.05	0.01		2										64			
LS	Mountrath	PWS	See report	1997	10-Nov	11.25	0	0		6	0.2		Sl chlor			6.9	279		14								9	0.04	0.05		<0.1										<20			
LS	Mountrath	PWS	See report	1997	8-Dec			0	0																																			
LS	Mountrath	PWS	See report	1997	8-Dec			0	0																																			
LS	Oakley Park	PWS	See report	1997	13-Jan			0	0																																			
LS	Oakley Park	PWS	See report	1997	25-Feb			0	0																																			
LS	Oakley Park	PWS	See report	1997	24-Mar	10.30	0	0			0.2		None			7	342								0.13																			
LS	Oakley Park	PWS	See report	1997	26-May	10.30	0	0		6	0.5		None			6.3			22								16.4	<0.01	0.03		0.9											21		
LS	Oakley Park	PWS	See report	1997	16-Jun		24	24																																				
LS	Oakley Park	PWS	See report	1997	23-Jun			0	0																																			
LS	Oakley Park	PWS	See report	1997	28-Jul			0	0																																			
LS	Oakley Park	PWS	See report	1997	11-Aug	10.30	0	0		12	0.3		None			7.3	315																											
LS	Oakley Park	PWS	See report	1997	8-Sep			0	0																																			
LS	Oakley Park	PWS	See report	1997	21-Oct			0	0																																			
LS	Oakley Park	PWS	See report	1997	8-Dec			0	0																																			
LS	Portarlinton	PWS	See report	1997	21-Jan			0	0																																			
LS	Portarlinton	PWS	See report	1997	21-Jan			0	0																																			
LS	Portarlinton	PWS	See report	1997	17-Feb	11.45	0	0			0.4		None			7.2	563		22						0.12		18.7	<0.01	0.02		2.4											50		
LS	Portarlinton	PWS	See report	1997	17-Feb	12.30	0	0			0.1		None			7	692		24						0.02		28.3	<0.01	0.03		0.3											40		
LS	Portarlinton	PWS	See report	1997	24-Mar	13.20	0	0			0.5		None			7.3	577								0.23																			
LS	Portarlinton	PWS	See report	1997	24-Mar	14.00	0	0			0.5		None			7.3	598								0.16																			
LS	Portarlinton	PWS	See report	1997	21-Apr	15.10	0	0	0.03	3	0.1		Sl chlor			6.3	653																											
LS	Portarlinton	PWS	See report	1997	21-Apr	15.00	0	0	0.035	3	0.8		Chlor			6.9	612								0.11																			
LS	Portarlinton	PWS	See report	1997	19-May	14.15	0	0	<0.02	1	0.2		Sl chlor			6.2																												
LS	Portarlinton	PWS	See report	1997	19-May			0	0		9	0.6		None			6.3								0.2																			
LS	Portarlinton	PWS	See report	1997	23-Jun	15.00	0	0	0.1	3	0.4		Chlor			6.1																												
LS	Portarlinton	PWS	See report	1997	23-Jun	15.10	0	0		12	4.9		Sl stale			6									1.16																			
LS	Portarlinton	PWS	See report	1997	28-Jul	14.15	0	0	0.06	4	0.3		Chlorine			7.2	553		25					<0.01		29.9	<0.01	0.03		0.1											<20			
LS	Portarlinton	PWS	See report	1997	28-Jul	14.15	0	0		11	0.3		None			7.6	584		28.2								11.1	<0.01	0.04		1.7											24		
LS	Portarlinton	PWS	See report	1997	26-Aug			0	0																																			
LS	Portarlinton	PWS	See report	1997	26-Aug			0	0																																			
LS	Portarlinton	PWS	See report	1997	29-Sep	15.00	0	0		5	0.1																																	

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SA	NAME OF WATER SUPPLY	CAT	SAMPLE LD.	YEAR	DAY/MO	TIME	T COLI	F COLI	RES CL	COLOUR	TURB - J	TURB - S	ODOUR	TASTE	TEMP	pH	COND1	COND2	CFide	SO4	Ca	Mg	Na	K	Al	Dry R	NO3	NO2	NH4	Kj N	Oxid	H2S	SEC	HCBN	PhOH	B	SURF	ORGC1	Fe	Mn	
LS	Portlaoise	PWS	See report	1997	23-Jun	14.30	0	0			4	0.4		None		6.1																									
LS	Portlaoise	PWS	See report	1997	23-Jun	15.00	0	0			4	0.4		None		6.2																									
LS	Portlaoise	PWS	See report	1997	1-Jul		0	0																																	
LS	Portlaoise	PWS	See report	1997	28-Jul	16.30	0	0			5	0.2		None		7.2	575																								
LS	Portlaoise	PWS	See report	1997	28-Jul	16.10	0	0			4	0.4		None		7.7	584																								
LS	Portlaoise	PWS	See report	1997	28-Jul	16.00	0	0			4	0.3		None		7.3	683																								
LS	Portlaoise	PWS	See report	1997	18-Aug	16.15	0	0	0.15		1	0.2		Sl chlor		7.4	537		20							20.2	0.02	<0.02		<0.1									27		
LS	Portlaoise	PWS	See report	1997	18-Aug	16.30	0	0			3	0.1		None		7.2	627		18							16.3	0.03	<0.02		<0.1									38		
LS	Portlaoise	PWS	See report	1997	18-Aug	16.00	0	0			8	1.6		None		7.3	497		23							16.5	0.03	<0.02		0.5								230	<20		
LS	Portlaoise	PWS	See report	1997	25-Sep		0	0																																	
LS	Portlaoise	PWS	See report	1997	30-Sep		0	0																																	
LS	Portlaoise	PWS	See report	1997	30-Sep		0	0																																	
LS	Portlaoise	PWS	See report	1997	30-Sep		0	0																																	
LS	Portlaoise	PWS	See report	1997	16-Oct		0	0																																	
LS	Portlaoise	PWS	See report	1997	20-Oct	15.15	0	0			4	0.4		None		7.2	317																								
LS	Portlaoise	PWS	See report	1997	20-Oct		0	0			4	0.6		None		7.3	584																								
LS	Portlaoise	PWS	See report	1997	20-Oct		0	0			5	0.3		None		7.2	659																								
LS	Portlaoise	PWS	See report	1997	29-Oct		0	0																																	
LS	Portlaoise	PWS	See report	1997	27-Nov		0	0																																	
LS	Portlaoise	PWS	See report	1997	27-Nov		0	0																																	
LS	Portlaoise	PWS	See report	1997	27-Nov		1	0																																	
LS	Portlaoise	PWS	See report	1997	1-Dec	16.50	0	0			4	0.3		None		7.2	605																								
LS	Portlaoise	PWS	See report	1997	1-Dec		0	0			2	0.4		None		7.2	603																								
LS	Portlaoise	PWS	See report	1997	1-Dec	15.40	0	0			5	0.3		None		7.3	530																								
LS	Portlaoise	PWS	See report	1997	11-Dec		0	0																																	
LS	Rathdowney	PWS	See report	1997	6-Jan	11.00	0	0	0.1		2	0.3		Chlor		7.3	666		21							19.9	<0.01	<0.02		<0.1									30		
LS	Rathdowney	PWS	See report	1997	6-Jan	10.15	0	0			6	0.4		None		7	764		19							16.8	<0.01	0.03		1									40		
LS	Rathdowney	PWS	See report	1997	19-Feb		0	0																																	
LS	Rathdowney	PWS	See report	1997	12-Mar		0	0																																	
LS	Rathdowney	PWS	See report	1997	21-Apr	11.50	0	0	0.2		7	0.4		Chlor		6.6	664																								
LS	Rathdowney	PWS	See report	1997	30-Jun		0	0																																	
LS	Rathdowney	PWS	See report	1997	28-Jul	11.00	0	0			6	3		Sl chlor		7.5	515		22							28.6	<0.01	0.04		<0.1									107		
LS	Rathdowney	PWS	See report	1997	25-Aug		0	0																																	
LS	Rathdowney	PWS	See report	1997	23-Sep		0	0																																	
LS	Rathdowney	PWS	See report	1997	13-Oct	11.25	0	0			4	2.1		None		7.5	665																								
LS	Rathdowney	PWS	See report	1997	10-Nov		0	0																																	
LS	Rathdowney	PWS	See report	1997	17-Dec		0	0																																	
LS	Rosennialis	PWS	See report	1997	20-Jan		0	0																																	
LS	Rosennialis	PWS	See report	1997	6-Mar		0	0																																	
LS	Rosennialis	PWS	See report	1997	23-Apr		0	0																																	
LS	Rosennialis	PWS	See report	1997	11-Jun		0	0																																	
LS	Rosennialis	PWS	See report	1997	28-Jul		13	0																																	
LS	Rosennialis	PWS	See report	1997	30-Sep		0	0																																	
LS	Rosennialis	PWS	See report	1997	29-Oct		0	0																																	
LS	Rosennialis	PWS	See report	1997	10-Nov	14.30	37	19								7.1	652		19							16.5	0.08	1.32		0.7									38		
LS	Rosennialis	PWS	See report	1997	24-Nov	16.00	0	0	0.15		4	0.2		Farmyard Chlorine		7.6	639		28								0.7	0.03	<0.02		<0.1									86	
LS	Rosennialis	PWS	See report	1997	17-Dec		0	0																																	
LS	Shanbeg [Rosennialis]	PWS	See report	1997	27-Jan		0	0																																	
LS	Shanbeg [Rosennialis]	PWS	See report	1997	10-Feb	13.30	0	0				0.1		None		7.3	654																								
LS	Shanbeg [Rosennialis]	PWS	See report	1997	24-Mar		0	0																																	
LS	Shanbeg [Rosennialis]	PWS	See report	1997	26-May	14.30	0	0	0.15		4	1		Sl chlor		6.4			29							1	<0.01	<0.02		<0.1										61	
LS	Shanbeg [Rosennialis]	PWS	See report	1997	26-May	15.00	0	0			3	0.7		None		6.1			23							25.4	<0.01	0.02		<0.1										26	
LS	Shanbeg [Rosennialis]	PWS	See report	1997	11-Jun		5	0																																	
LS	Shanbeg [Rosennialis]	PWS	See report	1997	28-Jul		0	0																																	
LS	Shanbeg [Rosennialis]	PWS	See report	1997	18-Aug	14.30	0	0	0.3		4	0.3		Chlor		7.6	621																								
LS	Shanbeg [Rosennialis]	PWS	See report	1997	18-Aug	15.00	0	0			4	0.1		None		7.2	588																								
LS	Shanbeg [Rosennialis]	PWS	See report	1997	8-Sep		0	0																																	
LS	Shanbeg [Rosennialis]	PWS	See report	1997	24-Nov	16.30	0	0			3																														

Appendix C: Co Laois Sanitary Authority 1997 Returns to the EPA.

SA	NAME OF WATER SUPPLY	CAT	SAMPLE LD.	YEAR	DAY/MO	TIME	T COLI	F COLI	RES CL	COLOUR	TURB - J	TURB - S	ODOUR	TASTE	TEMP	pH	COND1	COND2	Cl ⁻ de	SO4	Ca	Mg	Na	K	Al	Dry R	NO3	NO2	NH4	Kj N	Oxid	H2S	SEC	HCBN	PhOH	B	SURF	ORGC1	Fe	Mn	
LS	Timahoe	PWS	See report	1997	12-Feb		0	0																																	
LS	Timahoe	PWS	See report	1997	10-Mar		0	0																																	
LS	Timahoe	PWS	See report	1997	28-Apr		0	0																																	
LS	Timahoe	PWS	See report	1997	26-Jun	11.30	0	0		5	0.3		None			6.5																									
LS	Timahoe	PWS	See report	1997	28-Jul		0	0																																	
LS	Timahoe	PWS	See report	1997	11-Aug		0	0																																	
LS	Timahoe	PWS	See report	1997	29-Sep	12.30	0	0		6	0.1		None			7.5	509		12								19.2	<0.01	<0.02		0.2								29		
LS	Timahoe	PWS	See report	1997	28-Oct		0	0																																	
LS	Timahoe	PWS	See report	1997	24-Nov		0	0																																	
LS	Timahoe	PWS	See report	1997	8-Dec		0	0																																	
LS	Private Supply A	SMP	See report	1997	13-Jan		75	0																																	
LS	Private Supply A	SMP	See report	1997	20-Jan		>100	>100																																	
LS	Private Supply A	SMP	See report	1997	11-Feb		0	0																																	
LS	Private Supply AA	SMP	See report	1997	19-Aug		>100	>100																																	
LS	Private Supply AB	SMP	See report	1997	19-Aug		90	3																																	
LS	Private Supply AC	SMP	See report	1997	19-Aug		0	0																																	
LS	Private Supply AD	SMP	See report	1997	2-Sep		0	0																																	
LS	Private Supply AE	SMP	See report	1997	24-Sep		>100	>100																																	
LS	Private Supply AF	SMP	See report	1997	17-Sep		100	100																																	
LS	Private Supply AG	SMP	See report	1997	10-Nov	14.30	37	19																																	
LS	Private Supply AH	SMP	See report	1997	28-Oct		0	0																																	
LS	Private Supply AI	SMP	See report	1997	15-Oct		>100	70																																	
LS	Private Supply AJ	SMP	See report	1997	3-Nov		2	2																																	
LS	Private Supply AK	SMP	See report	1997	2-Dec		0	0																																	
LS	Private Supply B	SMP	See report	1997	30-Jan		0	0																																	
LS	Private Supply C	SMP	See report	1997	17-Feb		>100	>100																																	
LS	Private Supply D	SMP	See report	1997	17-Feb		8	2																																	
LS	Private Supply E	SMP	See report	1997	10-Mar		0	0																																	
LS	Private Supply F	SMP	See report	1997	16-Jun		0	0																																	
LS	Private Supply F	SMP	See report	1997			0	0																																	
LS	Private Supply G	SMP	See report	1997	6-Mar		0	0																																	
LS	Private Supply H	SMP	See report	1997	28-Apr		0	0																																	
LS	Private Supply I	SMP	See report	1997	21-Apr		0	0																																	
LS	Private Supply J	SMP	See report	1997	7-Apr		0	0																																	

Appendix C: Co Laois Sanitary Authority 1997 Returns to the EPA

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Appendix C: Co Laois Sanitary Authority 1997 Returns to the EPA

NAME OF WATER SUPPLY	CAT	SAMPLE I.D.	YEAR	DAY/MO	TIME	Cu - 1	Cu - 2	Zn - 1	Zn - 2	PHOS	FLUOR	SS	Ba	Ag	As	Cd	CN	Cr	Hg	Ni	Pb	Sb	PEST	PAH	STREP	CLOST	T Bact 37	T Bact 22	T BACT	T BACT	TH	ALKAL	AN DATE	LAB REF	SAMPLING POINT
Mountsalem GWS	GWS	See report	1997	29-Sep	9.45							Slight																							
Mountsalem GWS	GWS	See report	1997	5-Nov																															
Rahcen GWS	GWS	See report	1997	27-Jan																															
Rahcen GWS	GWS	See report	1997	26-May	10.30	<20			23			Slight									<10						14	45			144				
Rahcen GWS	GWS	See report	1997	9-Jun																															
Rahcen GWS	GWS	See report	1997	24-Jun																															
Ralish GWS	GWS	See report	1997	28-Apr																															
Ralish GWS	GWS	See report	1997	19-May	10.00							Slight																							
Ralish GWS	GWS	See report	1997	3-Jun																															
Ralish GWS	GWS	See report	1997	20-Oct	11.00	<20			<10			Slight									<10						<1	4			154				
Ratheniska GWS	GWS	See report	1997	19-May	15.30																														
Ratheniska GWS	GWS	See report	1997	1-Dec	12.25																														
Roundwood GWS	GWS	See report	1997	6-Jan																															
Roundwood GWS	GWS	See report	1997	9-Jun																															
Roundwood GWS	GWS	See report	1997	29-Sep	10.00							Slight																							
Roundwood GWS	GWS	See report	1997	5-Nov																															
Shanahoe/Ballacolla GWS	GWS	See report	1997	10-Feb	11.10	<20			10		<100	Slight									<10						<1	1			154				
Shanahoe/Ballacolla GWS	GWS	See report	1997	10-Feb	11.00	<20			10		<100	Slight									<10						<1	1			162				
Shanahoe/Ballacolla GWS	GWS	See report	1997	13-May																															
Shanahoe/Ballacolla GWS	GWS	See report	1997	11-Aug	10.10							Slight																							
The Heath	GWS	See report	1997	9-Jul																															
The Heath	GWS	See report	1997	16-Jul																															
The Heath GWS	GWS	See report	1997	11-Feb																															
The Heath GWS	GWS	See report	1997	17-Feb																															
The Heath GWS	GWS	See report	1997	24-Mar		<20			40			Slight									<10						1	1			124				
The Heath GWS	GWS	See report	1997	21-Apr																															
The Heath GWS	GWS	See report	1997	26-May																															
The Heath GWS	GWS	See report	1997	10-Jun																															
The Heath GWS	GWS	See report	1997	23-Jun																															
The Heath GWS	GWS	See report	1997	29-Sep	14.00	<20			18			Slight									<10						3	6			132				
The Heath GWS	GWS	See report	1997	29-Oct																															
The Heath GWS	GWS	See report	1997	10-Nov																															
The Heath GWS	GWS	See report	1997	17-Dec																															
Timraheen/Ballacolla GWS	GWS	See report	1997	13-May																															
Timraheen/Ballacolla GWS	GWS	See report	1997	25-Aug	12.05							Slight																							
Abbeyleix	PWS	See report	1997	27-Jan																															
Abbeyleix	PWS	See report	1997	27-Jan																															
Abbeyleix	PWS	See report	1997	5-Feb																															
Abbeyleix	PWS	See report	1997	11-Mar																															
Abbeyleix	PWS	See report	1997	11-Mar																															
Abbeyleix	PWS	See report	1997	21-Apr	10.30							Slight																							
Abbeyleix	PWS	See report	1997	21-Apr	10.00							Slight																							
Abbeyleix	PWS	See report	1997	28-May																															
Abbeyleix	PWS	See report	1997	3-Jun																															
Abbeyleix	PWS	See report	1997	16-Jun																															
Abbeyleix	PWS	See report	1997	8-Jul																															
Abbeyleix	PWS	See report	1997	30-Jul	9.45						1270																								
Abbeyleix	PWS	See report	1997	30-Jul	17.00						1250																								
Abbeyleix	PWS	See report	1997	30-Jul																															
Abbeyleix	PWS	See report	1997	18-Aug	10.00	<20			<10		1320	Slight									<10						<1	62							
Abbeyleix	PWS	See report	1997	18-Aug	10.15	<20			15		1040	Slight									<10						3	17			154				
Abbeyleix	PWS	See report	1997	29-Sep																															
Abbeyleix	PWS	See report	1997	29-Sep																															
Abbeyleix	PWS	See report	1997	29-Oct																															
Abbeyleix	PWS	See report	1997	29-Oct																															
Abbeyleix	PWS	See report	1997	10-Nov																															
Abbeyleix	PWS	See report	1997	1-Dec	14.30						1050	Slight																							
Abbeyleix	PWS	See report	1997	1-Dec	14.45						1140	Slight																							
Abbeyleix	PWS	See report	1997	1-Dec																															
Arles	PWS	See report	1997	13-Jan																															
Arles	PWS	See report	1997	23-Jun																															
Arles	PWS	See report	1997	12-Aug																															
Ballinakill	PWS	See report	1997	13-Jan							100	Slight																							
Ballinakill	PWS	See report	1997	5-Feb																															
Ballinakill	PWS	See report	1997	24-Mar																															
Ballinakill	PWS	See report	1997	29-Apr																															
Ballinakill	PWS	See report	1997	26-May	14.00	42			<10			Slight									<10						<1	1			126				
Ballinakill	PWS	See report	1997	25-Jun																															
Ballinakill	PWS	See report	1997	28-Jul	12.00							Slight																							
Ballinakill	PWS	See report	1997	12-Aug																															
Ballinakill	PWS	See																																	

Appendix C: Co Laois Sanitary Authority 1997 Returns to the EPA

NAME OF WATER SUPPLY	CAT	SAMPLE I.D.	YEAR	DAY/MO	TIME	Cu - 1	Cu - 2	Zn - 1	Zn - 2	PHOS	FLUOR	SS	Ba	Ag	As	Cd	CN	Cr	Hg	Ni	Pb	Sh	PEST	PAH	STREP	CLOST	T Bact 37	T Bact 22	T BACT	T BACT	TH	ALKAL	AN. DATE	LAB REF	SAMPLING POINT
Ballyroan	PWS	See report	1997	29-Apr																															
Ballyroan	PWS	See report	1997	19-May	10.30	<20		<10				Slight									<10						<1	<1			144				
Ballyroan	PWS	See report	1997	16-Jun																															
Ballyroan	PWS	See report	1997	7-Jul																															
Ballyroan	PWS	See report	1997	18-Aug	10.30							Slight																							
Ballyroan	PWS	See report	1997	8-Sep																															
Ballyroan	PWS	See report	1997	29-Sep																															
Ballyroan	PWS	See report	1997	28-Oct																															
Ballyroan	PWS	See report	1997	11-Nov																															
Ballyroan	PWS	See report	1997	8-Dec	10.00	<10		61				Slight									<10						<1	1			144				
Borris-in-Ossory	PWS	See report	1997	19-Feb																															
Borris-in-Ossory	PWS	See report	1997	12-Mar																															
Borris-in-Ossory	PWS	See report	1997	21-Apr	10.25						255	Slight																							
Borris-in-Ossory	PWS	See report	1997	30-Jun																															
Borris-in-Ossory	PWS	See report	1997	28-Jul	10.15	87		53				Slight									<10						<1	6							
Borris-in-Ossory	PWS	See report	1997	24-Sep																															
Borris-in-Ossory	PWS	See report	1997	13-Oct	11.00							Slight																							
Borris-in-Ossory	PWS	See report	1997	13-Oct																															
Borris-in-Ossory	PWS	See report	1997	27-Nov																															
Borris-in-Ossory	PWS	See report	1997	18-Dec																															
Clonaslee	PWS	See report	1997	13-Jan		50		10				Lge amt									<10						<1	9			62				
Clonaslee	PWS	See report	1997	24-Mar							870																								
Clonaslee	PWS	See report	1997	21-Apr	11.00						930	Slight																							
Clonaslee	PWS	See report	1997	10-Jun	11.30						280																								
Clonaslee	PWS	See report	1997	10-Jun							800																								
Clonaslee	PWS	See report	1997	28-Jul	12.10	151		<10			810	Slight									<10						<1	16			73				
Clonaslee	PWS	See report	1997	30-Sep																															
Clonaslee	PWS	See report	1997	20-Oct	14.00						940	Slight																							
Clonaslee	PWS	See report	1997	17-Dec																															
Clonaslee	PWS	See report	1997	6-May																															
Coolenaugh	PWS	See report	1997	24-Jun																															
Coolenaugh	PWS	See report	1997	4-Nov																															
Durrow	PWS	See report	1997	13-Jan								Slight																							
Durrow	PWS	See report	1997	13-Jan								Slight																							
Durrow	PWS	See report	1997	5-Feb																															
Durrow	PWS	See report	1997	5-Feb																															
Durrow	PWS	See report	1997	24-Mar																															
Durrow	PWS	See report	1997	24-Mar																															
Durrow	PWS	See report	1997	29-Apr																															
Durrow	PWS	See report	1997	29-Apr																															
Durrow	PWS	See report	1997	26-May	14.15	<20		<10				Slight									<10						<1	28			170				
Durrow	PWS	See report	1997	26-May	14.20	<20		11				Slight									<10						2	3			134				
Durrow	PWS	See report	1997	25-Jun																															
Durrow	PWS	See report	1997	25-Jun																															
Durrow	PWS	See report	1997	28-Jul	11.45							Slight																							
Durrow	PWS	See report	1997	28-Jul	11.35							Slight																							
Durrow	PWS	See report	1997	17-Sep																															
Durrow	PWS	See report	1997	17-Sep																															
Durrow	PWS	See report	1997	20-Oct		<20		79				Slight									<10						<1	18							
Durrow	PWS	See report	1997	20-Oct	11.05	<20		16				Slight									<10							14							
Durrow	PWS	See report	1997	27-Nov																															
Durrow	PWS	See report	1997	27-Nov																															
Durrow	PWS	See report	1997	15-Dec																															
Durrow	PWS	See report	1997	15-Dec																															
Emo	PWS	See report	1997	21-Jan																															
Emo	PWS	See report	1997	17-Feb	13.00							Slight																							
Emo	PWS	See report	1997	24-Mar																															
Emo	PWS	See report	1997	21-Apr																															
Emo	PWS	See report	1997	19-May																															
Emo	PWS	See report	1997	16-Jun	13.10	<20		11				Slight									<10						1	1			157				
Emo	PWS	See report	1997	28-Jul																															
Emo	PWS	See report	1997	26-Aug																															
Emo	PWS	See report	1997	22-Sep	15.20							Slight																							
Emo	PWS	See report	1997	29-Oct																															
Emo	PWS	See report	1997	19-Nov																															
Emo	PWS	See report	1997	8-Dec	15.00	<20		22				Slight									<10						2	3			167				
Killeshin	PWS	See report	1997	24-May																															
Killeshin	PWS	See report	1997	24-Jun																															
Mountmellick	PWS	See report	1997	13-Jan							830	Slight																							
Mountmellick	PWS	See report	1997	17-Feb	13.30	20		10			920	Slight									<10						5	5			27				
Mountmellick	PWS	See report	1997	24-Mar																															

Appendix C: Co Laois Sanitary Authority 1997 Returns to the EPA

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Appendix C: Co Laois Sanitary Authority 1997 Returns to the EPA.

NAME OF WATER SUPPLY	CAT	SAMPLE I.D.	YEAR	DAY/MO	TIME	Cu - 1	Cu - 2	Zn - 1	Zn - 2	PHOS	FLUOR	SS	Ba	Ag	As	Cd	CN	Cr	Hg	Ni	Pb	Sb	PEST	PAH	STREP	CLOST	T Bact 37	T Bact 22	T BACT	T BACT	TH	ALKAL	AN. DATE	LAB REF	SAMPLING POINT
Portlaoise	PWS	See report	1997	23-Jun	14.30						160	Slight																							
Portlaoise	PWS	See report	1997	23-Jun	15.00						160	Slight																							
Portlaoise	PWS	See report	1997	1-Jul																															
Portlaoise	PWS	See report	1997	28-Jul	16.30							Slight																							
Portlaoise	PWS	See report	1997	28-Jul	16.10							Slight																							
Portlaoise	PWS	See report	1997	28-Jul	16.00							Slight																							
Portlaoise	PWS	See report	1997	18-Aug	16.15	<20		12				Slight									<10						<1	<1			114				
Portlaoise	PWS	See report	1997	18-Aug	16.30	<20		<10				Slight									<10						<1	<1			157				
Portlaoise	PWS	See report	1997	18-Aug	16.00	438		52				Some									<10						<1	2			115				
Portlaoise	PWS	See report	1997	25-Sep																															
Portlaoise	PWS	See report	1997	30-Sep																															
Portlaoise	PWS	See report	1997	30-Sep																															
Portlaoise	PWS	See report	1997	30-Sep																															
Portlaoise	PWS	See report	1997	16-Oct																															
Portlaoise	PWS	See report	1997	20-Oct	15.15							Slight																							
Portlaoise	PWS	See report	1997	20-Oct								Slight																							
Portlaoise	PWS	See report	1997	20-Oct								Slight																							
Portlaoise	PWS	See report	1997	29-Oct																															
Portlaoise	PWS	See report	1997	27-Nov																															
Portlaoise	PWS	See report	1997	27-Nov																															
Portlaoise	PWS	See report	1997	27-Nov																															
Portlaoise	PWS	See report	1997	1-Dec	16.50							Slight																							
Portlaoise	PWS	See report	1997	1-Dec								Slight																							
Portlaoise	PWS	See report	1997	1-Dec	15.40							Slight																							
Portlaoise	PWS	See report	1997	11-Dec																															
Rathdowney	PWS	See report	1997	6-Jan	11.00	40		60				Slight									<10						<1	<1			155				
Rathdowney	PWS	See report	1997	6-Jan	10.15	30		20			160	Slight									<10						<1	<1			173				
Rathdowney	PWS	See report	1997	19-Feb																															
Rathdowney	PWS	See report	1997	12-Mar																															
Rathdowney	PWS	See report	1997	21-Apr	11.50						150	Slight																							
Rathdowney	PWS	See report	1997	30-Jun																															
Rathdowney	PWS	See report	1997	28-Jul	11.00	33		58				Some									<10						<1	2			110				
Rathdowney	PWS	See report	1997	25-Aug																															
Rathdowney	PWS	See report	1997	23-Sep																															
Rathdowney	PWS	See report	1997	13-Oct	11.25							Some																							
Rathdowney	PWS	See report	1997	10-Nov																															
Rathdowney	PWS	See report	1997	17-Dec																															
Rosennialis	PWS	See report	1997	20-Jan																															
Rosennialis	PWS	See report	1997	6-Mar																															
Rosennialis	PWS	See report	1997	23-Apr																															
Rosennialis	PWS	See report	1997	11-Jun																															
Rosennialis	PWS	See report	1997	28-Jul																															
Rosennialis	PWS	See report	1997	30-Sep																															
Rosennialis	PWS	See report	1997	29-Oct																															
Rosennialis	PWS	See report	1997	10-Nov	14.30	27		34				Slight									<10						34	300			147				
Rosennialis	PWS	See report	1997	24-Nov	16.00	31		42				Slight									<10						<1	<1			138				
Rosennialis	PWS	See report	1997	17-Dec																															
Shanbeg [Rosennialis]	PWS	See report	1997	27-Jan																															
Shanbeg [Rosennialis]	PWS	See report	1997	10-Feb	13.30							Slight																							
Shanbeg [Rosennialis]	PWS	See report	1997	24-Mar																															
Shanbeg [Rosennialis]	PWS	See report	1997	26-May	14.30	42		34				Slight									<10						<1	6			139				
Shanbeg [Rosennialis]	PWS	See report	1997	26-May	15.00	34		26				Slight									<10						<1	127			147				
Shanbeg [Rosennialis]	PWS	See report	1997	11-Jun																															
Shanbeg [Rosennialis]	PWS	See report	1997	28-Jul																															
Shanbeg [Rosennialis]	PWS	See report	1997	18-Aug	14.30							Slight																							
Shanbeg [Rosennialis]	PWS	See report	1997	18-Aug	15.00							Slight																							
Shanbeg [Rosennialis]	PWS	See report	1997	8-Sep																															
Shanbeg [Rosennialis]	PWS	See report	1997	24-Nov	16.30	76		155				Slight									<10						<1	155			145				
Shanbeg [Rosennialis]	PWS	See report	1997	2-Dec																															
Stradbally	PWS	See report	1997	11-Feb																															
Stradbally	PWS	See report	1997	24-Mar		<20		30			150	Slight									<10						3	1			124				
Stradbally	PWS	See report	1997	9-Apr																															
Stradbally	PWS	See report	1997	16-Jun																															
Stradbally	PWS	See report	1997	28-Jul	10.30							Slight																							
Stradbally	PWS	See report	1997	17-Nov	14.30							Slight																							
The Strand	PWS	See report	1997	26-May																															
The Strand	PWS	See report	1997	4-Nov																															
The Swan	PWS	See report	1997	6-Jan	12.00						100	Slight																							
The Swan	PWS	See report	1997	12-Feb																															
The Swan	PWS	See report	1997	24-Mar	11.00						120	Slight																							
The Swan	PWS	See report	1997	14-Apr																															

Appendix C: Co Laois Sanitary Authority 1997 Returns to the EPA.

NAME OF WATER SUPPLY	CAT	SAMPLE I.D.	YEAR	DAY/MO	TIME	Cu - 1	Cu - 2	Zn - 1	Zn - 2	PHOS	FLUOR	SS	Ba	Ag	As	Cd	CN	Cr	Hg	Ni	Pb	Sb	PEST	PAH	STREP	CLOST	T Bact 37	T Bact 22	T BACT	T BACT	TH	ALKAL	AN. DATE	LAB REF	SAMPLING POINT
Timahoe	PWS	See report	1997	12-Feb																															
Timahoe	PWS	See report	1997	10-Mar																															
Timahoe	PWS	See report	1997	28-Apr																															
Timahoe	PWS	See report	1997	26-Jun	11.30							Slight																							
Timahoe	PWS	See report	1997	28-Jul																															
Timahoe	PWS	See report	1997	11-Aug																															
Timahoe	PWS	See report	1997	29-Sep	12.30	<20			13			Slight									<10						<1	54			116				
Timahoe	PWS	See report	1997	28-Oct																															
Timahoe	PWS	See report	1997	24-Nov																															
Timahoe	PWS	See report	1997	8-Dec																															
Private Supply A	SMP	See report	1997	13-Jun																															
Private Supply A	SMP	See report	1997	20-Jan																															
Private Supply A	SMP	See report	1997	11-Feb																															
Private Supply AA	SMP	See report	1997	19-Aug																															
Private Supply AB	SMP	See report	1997	19-Aug																															
Private Supply AC	SMP	See report	1997	19-Aug																															
Private Supply AD	SMP	See report	1997	2-Sep																															
Private Supply AE	SMP	See report	1997	24-Sep																															
Private Supply AF	SMP	See report	1997	17-Sep																															
Private Supply AG	SMP	See report	1997	10-Nov	14.30																						34	300							
Private Supply AH	SMP	See report	1997	28-Oct																															
Private Supply AI	SMP	See report	1997	15-Oct																															
Private Supply AJ	SMP	See report	1997	3-Nov																															
Private Supply AK	SMP	See report	1997	2-Dec																															
Private Supply B	SMP	See report	1997	30-Jan																															
Private Supply C	SMP	See report	1997	17-Feb																															
Private Supply D	SMP	See report	1997	17-Feb																															
Private Supply E	SMP	See report	1997	10-Mar																															
Private Supply F	SMP	See report	1997	16-Jun																															
Private Supply F	SMP	See report	1997																																
Private Supply G	SMP	See report	1997	6-Mar																															
Private Supply H	SMP	See report	1997	28-Apr																															
Private Supply I	SMP	See report	1997	21-Apr																															
Private Supply J	SMP	See report	1997	7-Apr																															
Private Supply K	SMP	See report	1997	27-May																															
Private Supply L	SMP	See report	1997	5-May																															
Private Supply L	SMP	See report	1997	13-May																															
Private Supply M	SMP	See report	1997	13-May																															
Private Supply N	SMP	See report	1997	16-Jun																															
Private Supply N	SMP	See report	1997	24-Jun																															
Private Supply O	SMP	See report	1997	9-Jun																															
Private Supply P	SMP	See report	1997	5-Jun																															
Private Supply Q	SMP	See report	1997	30-Jun																															
Private Supply R	SMP	See report	1997	11-Jun																															
Private Supply S	SMP	See report	1997	30-Jun																															
Private Supply T	SMP	See report	1997	11-Jun																															
Private Supply U	SMP	See report	1997	8-Jul																															
Private Supply V	SMP	See report	1997	1-Jul																															
Private Supply W	SMP	See report	1997	2-Jul																															
Private Supply X	SMP	See report	1997	21-Jul																															
Private Supply Y	SMP	See report	1997	23-Jul																															
Private Supply Z	SMP	See report	1997	18-Aug																															
Well at Cranoge	SMP	See report	1997	11-Mar																															

APPENDIX D

Appendix D: Co Laois Sanitary Authority 1997 Returns to the EPA.

SA	NAME OF WATER SUPPL	CAT	SAMPLE I.D.	YEAR	DAY/MO	TIME	T COLI	F COLI	RES CL	COLOUR	TURB - J	TURB - S	ODOUR	TASTE	TEMP	pH	CONDI	COND2	Cl ⁻ ide	SO4	Ca	Mg	Na	K	Al	Dry R	NO3	NO2	NH4	Kj N	Oxid	H2S	SEC	HCBN	PhOH	B	SURF	ORGC1	Fe
LS	Abbeyleix	PWS	See orig data	1998	20-Apr	16.31	0	0	0.16	5		0.5	0		10.1	7.3		785	19	17	143.2	15.3	10	1.8			32.8	<0.013	<0.01			Undet							<60
LS	Abbeyleix	PWS	See orig data	1998	20-Apr	16.07	0	0	0.14	5		0.2	0		9.7	7.4		750	19	15	137.2	14.1	9.7	1.3			33.7	<0.013	<0.01			Undet							69
LS	Abbeyleix	PWS	See orig data	1998	30-Jun	12.45	0	0	0.08																														
LS	Abbeyleix	PWS	See orig data	1998	30-Jun	12.45	0	0	0.08																														
LS	Abbeyleix	PWS	See orig data	1998	4-Aug	13.10	0	0	0.04																														
LS	Abbeyleix	PWS	See orig data	1998	5-Aug	13.40	0	0	0.08																														
LS	Abbeyleix	PWS	See orig data	1998	5-Aug	13.40	0	0	0.12																														
LS	Abbeyleix	PWS	See orig data	1998	1-Sep	12.00	0	0	0.05																														
LS	Abbeyleix	PWS	See orig data	1998	1-Sep	12.05	0	0	0.1																														
LS	Abbeyleix	PWS	See orig data	1998	1-Sep	11.20	0	0	0.48	<5		<0.1	0		17	7.3		803	18	15	136.4	14.4	9.8	2.1			31.4	<0.066	<0.03			Undet							
LS	Abbeyleix	PWS	See orig data	1998	1-Sep	11.40	0	0	0.44	<5		<0.1	0		14.3	7.3		756	18	14	128.4	13	9	1.5			30.6	<0.066	<0.03			Undet							
LS	Abbeyleix	PWS	See orig data	1998	1-Oct	11.15	0	0	0.1																														
LS	Abbeyleix	PWS	See orig data	1998	1-Oct	11.30	0	0	0.11																														
LS	Abbeyleix	PWS	See orig data	1998	3-Nov	12.10	0	0	0.06																														
LS	Abbeyleix	PWS	See orig data	1998	3-Nov	12.15	0	0	0.13																														
LS	Abbeyleix	PWS	See orig data	1998	2-Dec	11.30	0	0	0.03																														
LS	Abbeyleix	PWS	See orig data	1998	2-Dec	13.00	0	0	0.16																														
LS	Arles	PWS	See orig data	1998	20-Apr	14.37	0	0	0.12	10		0.3	0		8.8	7.1		768	79	31	112	8.3	27.3	17.7			28.3	<0.013	<0.01			Undet							<60
LS	Arles	PWS	See orig data	1998	8-Jul	11.45	0	0	0.54																														
LS	Arles	PWS	See orig data	1998	25-Aug	11.50	0	0	0.59																														
LS	Arles	PWS	See orig data	1998	22-Sep	11.55	0	0	0.64																														
LS	Arles	PWS	See orig data	1998	20-Oct	12.10	0	0	1.22																														
LS	Arles	PWS	See orig data	1998	24-Nov	11.00	0	0	0.23																														
LS	Arles	PWS	See orig data	1998	21-Dec	11.15	0	0	0.53																														
LS	Ballacolla	GWS	See orig data	1998	14-Jul	10.40	1	0	0.04																														
LS	Ballacolla	GWS	See orig data	1998	14-Jul	10.55	19	0	0.01																														
LS	Ballacolla	GWS	See orig data	1998	14-Jul	11.20	49	2	0.03																														
LS	Ballacolla	GWS	See orig data	1998	14-Jul	11.40	47	8	0.05																														
LS	Ballacolla	GWS	See orig data	1998	14-Jul	10.40	1	0	0.09																														
LS	Ballacolla	GWS	See orig data	1998	14-Jul	10.55	19	0	0.02																														
LS	Ballacolla	GWS	See orig data	1998	14-Jul	11.20	49	2	0.06																														
LS	Ballacolla	GWS	See orig data	1998	14-Jul	11.40	47	8	0.05																														
LS	Ballacolla	GWS	See orig data	1998	18-Aug	9.50	0	0	0.21																														
LS	Ballacolla	GWS	See orig data	1998	18-Aug	10.00	7	0	0.15																														
LS	Ballacolla	GWS	See orig data	1998	18-Aug	10.10	60	4	0																														
LS	Ballacolla	GWS	See orig data	1998	18-Aug	10.30	3	0	0																														
LS	Ballacolla	GWS	See orig data	1998	8-Sep	11.00	1	1	0.01																														
LS	Ballacolla	GWS	See orig data	1998	8-Sep	11.10	45	40	0.01																														
LS	Ballacolla	GWS	See orig data	1998	8-Sep	11.20	110	120	0.11																														
LS	Ballacolla	GWS	See orig data	1998	8-Sep	11.40	96	1	0.1																														
LS	Ballacolla	GWS	See orig data	1998	13-Oct	10.50	6	0	0.05																														
LS	Ballacolla	GWS	See orig data	1998	13-Oct	10.55	20	3	0.02																														
LS	Ballacolla	GWS	See orig data	1998	13-Oct	11.00	19	4	0																														
LS	Ballacolla	GWS	See orig data	1998	13-Oct	11.25	20	0	0																														
LS	Ballacolla	GWS	See orig data	1998	25-Nov	11.30	2	0	0.05																														
LS	Ballacolla	GWS	See orig data	1998	25-Nov	11.45	11	0	0.05																														
LS	Ballacolla	GWS	See orig data	1998	25-Nov	12.00	36	19	0.06																														
LS	Ballacolla	GWS	See orig data	1998	25-Nov	12.15	6	0	0.06																														
LS	Ballinakill (Cloghogue/Fermo	PWS	See orig data	1998	22-Apr	14.40	0	0	0.25	<5		0.6	0		9.2	7.7		718	21	27	114.8	16.5	8.9	3.7			52.3	<0.016	<0.03			Undet							<60
LS	Ballinakill (Cloghogue/Fermo	PWS	See orig data	1998	30-Jun	13.00	0	0	0.18																														
LS	Ballinakill (Cloghogue/Fermo	PWS	See orig data	1998	30-Jun	13.00	0	0	0.09																														
LS	Ballinakill (Cloghogue/Fermo	PWS	See orig data	1998	4-Aug	13.25	0	0	0.15																														
LS	Ballinakill (Cloghogue/Fermo	PWS	See orig data	1998	1-Sep	10.55	0	0	0.33	<5		<0.1	Slight		15.8	7.7		732	18	12	116.4	16.2	9	3.5			34.5	<0.066	<0.03			Undet							
LS	Ballinakill (Cloghogue/Fermo	PWS	See orig data	1998	1-Sep	11.40	0	0	0.2																														
LS	Ballinakill (Cloghogue/Fermo	PWS	See orig data	1998	1-Oct	11.40	0	0	0.11																														
LS	Ballinakill (Cloghogue/Fermo	PWS	See orig data	1998	3-Nov	12.30	0	0	0.26																														
LS	Ballybrittas	GWS	See orig data	1998	12-Aug	12.05	0	0	0.2																														
LS	Ballyinan	PWS	See orig data	1998	20-Apr	14.03	0	0	0.3	5		0.3	0		9.1	7.8																							

Appendix D: Co Laois Sanitary Authority 1997 Returns to the EPA.

SA	NAME OF WATER SUPPL	CAT	SAMPLE I.D.	YEAR	DAY/MO	TIME	T COLI	F COLI	RES CL	COLOUR	TURB - J	TURB - S	ODOUR	TASTE	TEMP	pH	COND1	COND2	Cl ⁻ ide	SO4	Ca	Mg	Na	K	Al	Dry R	NO3	NO2	NH4	Kj N	Oxid	H2S	SEC	HCBN	PhOH	B	SURF	ORGC1	Fe
LS	Ballyroan	PWS	See orig data	1998	1-Sep	11.25	0	0	0.1																														
LS	Ballyroan	PWS	See orig data	1998	1-Sep	12.05	0	0	0.24	<5		<0.1	0		15	7.5		698	16	16	118.4	11.1	9.1	2.4			25.2	<0.066	<0.03			Undet							
LS	Ballyroan	PWS	See orig data	1998	1-Oct	11.05	0	0	0.09																														
LS	Ballyroan	PWS	See orig data	1998	3-Nov	11.50	0	0	0.17																														
LS	Ballyroan	PWS	See orig data	1998	2-Dec	12.30	0	0	0.14																														
LS	Borris-in-Ossory	PWS	See orig data	1998	22-Apr	10.59	0	0	0.54	<5		0.5	0		9.2	7.1		837	18	66	164.4	6.6	12.2	2.6			24.8	<0.016	<0.03			Undet						<60	
LS	Borris-in-Ossory	PWS	See orig data	1998	30-Jun	12.10	0	0	0.05																														
LS	Borris-in-Ossory	PWS	See orig data	1998	30-Jun	12.10	0	0	0.32																														
LS	Borris-in-Ossory	PWS	See orig data	1998	11-Aug	11.31	0	0	0.09																														
LS	Borris-in-Ossory	PWS	See orig data	1998	11-Aug	11.35	0	0	0.65																														
LS	Borris-in-Ossory	PWS	See orig data	1998	9-Sep	11.10	0	0	0.26																														
LS	Borris-in-Ossory	PWS	See orig data	1998	6-Oct	11.25	0	0	0.02																														
LS	Borris-in-Ossory	PWS	See orig data	1998	3-Nov	11.25	0	0	0.36	<5		0.4	0		9.4	7.2		855	16	35	158.8	7	12.1	3	0.036		13.7	<0.099	<0.26			Undet						<60	
LS	Borris-in-Ossory	PWS	See orig data	1998	10-Nov	11.30	0	0	0.04																														
LS	Borris-in-Ossory	PWS	See orig data	1998	9-Dec	13.10	0	0	0.1																														
LS	Clonaslee	PWS	See orig data	1998	21-Apr	11.43	0	0	0.1	10		0.9	0		9.1	7.3		379	14	20	59.2	8.5	8.7	2.5			7	<0.016	<0.03			Undet						99	
LS	Clonaslee	PWS	See orig data	1998	22-Jul	12.15	31	0	0																														
LS	Clonaslee	PWS	See orig data	1998	22-Jul	12.15	31	0	0																														
LS	Clonaslee	PWS	See orig data	1998	29-Jul	14.05	0	0	0.02																														
LS	Clonaslee	PWS	See orig data	1998	29-Jul	14.05	0	0	0.08																														
LS	Clonaslee	PWS	See orig data	1998	3-Sep	11.40	0	0	0.11																														
LS	Clonaslee	PWS	See orig data	1998	14-Oct	11.15	0	0	0																														
LS	Clonaslee	PWS	See orig data	1998	3-Nov	13.55	0	0	0.49	<5		0.2	0		9.3	7.4		332	15	26	45.2	8.4	7.9	2.7			7.5	<0.099	<0.26			Undet						<60	
LS	Clonaslee	PWS	See orig data	1998	4-Nov	11.45	0	0	0.09																														
LS	Clonaslee	PWS	See orig data	1998	1-Dec	10.30	0	0	0.21																														
LS	Cullohill	GWS	See orig data	1998	18-Aug	10.50	6	3	0																														
LS	Cullohill	GWS	See orig data	1998	8-Sep	12.00	12	4	0.13																														
LS	Cullohill	GWS	See orig data	1998	13-Oct	12.40	9	1	0																														
LS	Cullohill	GWS	See orig data	1998	18-Nov	11.20	0	0	0.08																														
LS	Donaghmore	GWS	See orig data	1998	14-Jul	12.25	27	0	0.03																														
LS	Donaghmore	GWS	See orig data	1998	14-Jul	11.55	27	0	0																														
LS	Donaghmore	GWS	See orig data	1998	10-Aug	11.20	16	0	0.07																														
LS	Donaghmore	GWS	See orig data	1998	11-Aug	12.05	20	0	0.07																														
LS	Donaghmore	GWS	See orig data	1998	11-Aug	11.20	20	0	0.07																														
LS	Donaghmore	GWS	See orig data	1998	9-Sep	11.20	11	0	0.08																														
LS	Donaghmore	GWS	See orig data	1998	6-Oct	11.45	29	6	0																														
LS	Donaghmore	GWS	See orig data	1998	10-Nov	11.30	24	0	0																														
LS	Durrow	PWS	See orig data	1998	22-Apr	14.09	0	0	0.26	<5		0.4	0		9.1	7.8		732	24	31	119.6	15.4	9.9	3			61.6	<0.016	<0.03			Undet						<60	
LS	Durrow	PWS	See orig data	1998	30-Jun	15.00	0	0	0.34																														
LS	Durrow	PWS	See orig data	1998	30-Jun	15.00	0	0	0.31																														
LS	Durrow	PWS	See orig data	1998	14-Jul	13.50	0	0	0.23																														
LS	Durrow	PWS	See orig data	1998	14-Jul	13.50	0	0	0.23																														
LS	Durrow	PWS	See orig data	1998	18-Aug	11.15	0	0	0																														
LS	Durrow	PWS	See orig data	1998	18-Aug	11.40	0	0	0																														
LS	Durrow	PWS	See orig data	1998	8-Sep	12.15	0	0	0.31																														
LS	Durrow	PWS	See orig data	1998	8-Sep	12.25	0	0	0.05																														
LS	Durrow	PWS	See orig data	1998	9-Sep	16.00	0	0	0.36	<5		<0.1	0		15.7	7.9		721	21	16	137.2	21.5	8.8	2	0.011		40.3	<0.066	<0.03			Undet						<60	
LS	Durrow	PWS	See orig data	1998	13-Oct	11.40	0	0	0.13																														
LS	Durrow	PWS	See orig data	1998	13-Oct	11.40	0	0	0.14																														
LS	Durrow	PWS	See orig data	1998	18-Nov	11.30	0	0	0.14																														
LS	Durrow	PWS	See orig data	1998	18-Nov	11.50	2	0	0.07																														
LS	Durrow	PWS	See orig data	1998	25-Nov	12.30	0	0	0.39																														
LS	Durrow	PWS	See orig data	1998	10-Dec	11.40	0	0	0.23																														
LS	Durrow	PWS	See orig data	1998	10-Dec	11.50	0	0	0.46																														
LS	Emo	PWS	See orig data	1998	3-Nov	15.20	0	0	0.32	<5		<0.1	0		8.5	7.7		630	19	14	104.4	12	9	1.7			15.9	<0.099	<0.26			Undet						<60	
LS	Errill	PWS	See orig data	1998	14-Jul	12.50	52	2	0.03																														
LS	Errill	PWS	See orig data	1998	10-Aug	12.30	0	0	0.18																														
LS	Errill	PWS	See orig data	1998	11-Aug	12.30	0	0	0.18																														

Appendix D: Co Laois Sanitary Authority 1997 Returns to the EPA.

SA	NAME OF WATER SUPPL	CAT	SAMPLE I.D.	YEAR	DAY/MO	TIME	T COLI	F COLI	RES CL	COLOUR	TURB - J	TURB - S	ODOUR	TASTE	TEMP	pH	COND1	COND2	Cl ⁻ ide	SO4	Ca	Mg	Na	K	Al	Dry R	NO3	NO2	NH4	Kj N	Oxid	H2S	SEC	HCBN	PhOH	B	SURF	ORGC1	Fe
LS	Graiguccullen	PWS	See orig data	1998	24-Nov	12.15	0	0	0.11																														
LS	Graiguccullen	PWS	See orig data	1998	20-Dec	11.30	0	0	0.06																														
LS	Killeaney	GWS	See orig data	1998	12-Aug	12.30	4	0	0.04																														
LS	Killeaney	GWS	See orig data	1998	12-Aug	12.30	4	0	0.04																														
LS	Killeaney	GWS	See orig data	1998	15-Sep	12.00	0	0	0.09																														
LS	Killeaney	GWS	See orig data	1998	7-Oct	12.20	3	4	0.07																														
LS	Killenard	GWS	See orig data	1998	12-Aug	12.00	0	0	0.04																														
LS	Killenard	GWS	See orig data	1998	12-Aug		0	0	0.05																														
LS	Killenard	GWS	See orig data	1998	15-Sep	11.45	0	0	0.02																														
LS	Killenard	GWS	See orig data	1998	7-Oct	12.10	0	0	0.05																														
LS	Mountmellick	PWS	See orig data	1998	21-Apr	13.42	0	0	0.23	30		0.9	0		9.9	7.6		177	13	6	27.3	2.4	3.9	<0.3			2.3	<0.016	<0.03			Undet						379	
LS	Mountmellick	PWS	See orig data	1998	24-Jun	12.45	0	0	0.07																														
LS	Mountmellick	PWS	See orig data	1998	24-Jun	12.45	0	0	0.07																														
LS	Mountmellick	PWS	See orig data	1998	24-Jun	12.45	0	0	0.23																														
LS	Mountmellick	PWS	See orig data	1998	22-Jul	13.00	0	0	0.04																														
LS	Mountmellick	PWS	See orig data	1998	22-Jul	13.15	0	0	0.09																														
LS	Mountmellick	PWS	See orig data	1998	22-Jul	13.00	0	0																															
LS	Mountmellick	PWS	See orig data	1998	22-Jul	13.15	0	0																															
LS	Mountmellick	PWS	See orig data	1998	5-Aug	11.10	0	0	0.08																														
LS	Mountmellick	PWS	See orig data	1998	5-Aug	11.20	0	0	0.09																														
LS	Mountmellick	PWS	See orig data	1998	5-Aug	10.45	3	0	0.25																														
LS	Mountmellick	PWS	See orig data	1998	5-Aug	10.55	0	0	0.1																														
LS	Mountmellick	PWS	See orig data	1998	3-Sep	12.22	1	0	0.18																														
LS	Mountmellick	PWS	See orig data	1998	3-Sep	12.30	0	0	0.1																														
LS	Mountmellick	PWS	See orig data	1998	9-Sep	12.45	0	0	0.15	60		1.5	0		16.3	7.6		384	18	12	60.8	8.7	8.1	0.9	0.114		9.3	<0.066	<0.03			Undet						354	
LS	Mountmellick	PWS	See orig data	1998	14-Oct	11.45	0	0	0.23																														
LS	Mountmellick	PWS	See orig data	1998	14-Oct	11.55	0	0	0.51																														
LS	Mountmellick	PWS	See orig data	1998	4-Nov	12.15	0	0	0.22																														
LS	Mountmellick	PWS	See orig data	1998	4-Nov	12.15	0	0	0.63																														
LS	Mountmellick	PWS	See orig data	1998	1-Dec	11.30	0	0	0.22																														
LS	Mountmellick	PWS	See orig data	1998	1-Dec	11.45	0	0	0.52																														
LS	Mountrath	PWS	See orig data	1998	22-Apr	12.18	0	0	0.32	<5		0.8	0		9	7.1		243	12	17	32.8	5	7.5	1.8			15.7	<0.016	<0.03			Undet						<60	
LS	Mountrath	PWS	See orig data	1998	30-Jun	11.51	0	0	0.56																														
LS	Mountrath	PWS	See orig data	1998	11-Aug	11.55	0	0	0.24																														
LS	Mountrath	PWS	See orig data	1998	11-Aug	12.06	0	0	0.6																														
LS	Mountrath	PWS	See orig data	1998	11-Aug	12.06	0	0	0.53																														
LS	Mountrath	PWS	See orig data	1998	11-Aug	11.55	0	0	0.15																														
LS	Mountrath	PWS	See orig data	1998	9-Sep	11.35	0	0	0.22																														
LS	Mountrath	PWS	See orig data	1998	9-Sep	11.35	0	0	0.07																														
LS	Mountrath	PWS	See orig data	1998	6-Oct	12.00	0	0	0.43																														
LS	Mountrath	PWS	See orig data	1998	6-Oct	11.50	0	0	0.04																														
LS	Mountrath	PWS	See orig data	1998	3-Nov	11.50	0	0	0.2	15		0.7	0		9.2	7.3		287	13	8	42.8	5.4	7.3	2.2	0.049		8.4	<0.099	<0.26			Undet						<60	
LS	Mountrath	PWS	See orig data	1998	10-Nov	12.30	0	0	0.42																														
LS	Mountrath	PWS	See orig data	1998	10-Nov	12.15	0	0	0.18																														
LS	Mountrath	PWS	See orig data	1998	8-Dec	13.05	0	0	0.54																														
LS	Mountrath	PWS	See orig data	1998	8-Dec	13.45	0	0	0.25																														
LS	Portarlinton	PWS	See orig data	1998	21-Apr	15.10	0	0	0.31	10		0.5	0		9.2	7.7		593	22	32	112	6.9	10.7	2.9			12.9	<0.016	<0.03			Undet						74	
LS	Portarlinton	PWS	See orig data	1998	21-Apr	14.40	0	0	0.34	15		0.7	0		10.1	7.7		587	22	32	112	6.9	8.7	2.2			12.8	<0.016	<0.03			Undet						79	
LS	Portarlinton	PWS	See orig data	1998	24-Jun	13.05	1	0	0.48																														
LS	Portarlinton	PWS	See orig data	1998	24-Jun	13.20	0	0	0.79																														
LS	Portarlinton	PWS	See orig data	1998	24-Jun	13.20	0	0	0.5																														
LS	Portarlinton	PWS	See orig data	1998	5-Aug	11.50	0	0	0.4																														
LS	Portarlinton	PWS	See orig data	1998	5-Aug	12.05	2	0	1.07																														
LS	Portarlinton	PWS	See orig data	1998	5-Aug	11.50	0	0	0.4																														
LS	Portarlinton	PWS	See orig data	1998	5-Aug	12.05	2	0	0.69																														
LS	Portarlinton	PWS	See orig data	1998	3-Sep	12.35	0	0	0.66																														
LS	Portarlinton	PWS	See orig data	1998	3-Sep	12.15	0	0	0.94																														
LS	Portarlinton	PWS	See orig data	1998	9-Sep	14.30	0	0	0.37	10		1.4	0		16.7	7.4		408	18	41	71.6	5.5	8	2.7	0.499		7.5	<0.066	<0.03			Undet						107	
LS	Portarlinton	PWS	See orig data	1998	9-Sep	14.50	0	0	0.24	10		1.4	0		16.9	7.4																							

Appendix D: Co Laois Sanitary Authority 1997 Returns to the EPA.

SA	NAME OF WATER SUPPLY	CAT	SAMPLE ID.	YEAR	DAY/MO	TIME	T COLI	F COLI	RES CL	COLOUR	TURB-J	TURB-S	ODOUR	TASTE	TEMP	pH	COND1	COND2	Cl ⁻ ide	SO4	Ca	Mg	Na	K	Al	Dry R	NO3	NO2	NH4	Kj N	Oxid	H2S	SEC	HCBN	PhOH	B	SURF	ORGC1	Fe
LS	Portlaoise	PWS	See orig data	1998	21-Apr	17.00	0	0	0.16	5		0.2	0		10.2	7.3		796	19	57	146	18	9.5	2			17.5	<0.016	<0.03			Undet							<60
LS	Portlaoise	PWS	See orig data	1998	29-May	9.15	0	0		5						7.3		690																					
LS	Portlaoise	PWS	See orig data	1998	24-Jun	12.00	0	0	0.22																														
LS	Portlaoise	PWS	See orig data	1998	24-Jun	12.20	0	0	0.15																														
LS	Portlaoise	PWS	See orig data	1998	24-Jun	14.45	0	0	0.07																														
LS	Portlaoise	PWS	See orig data	1998	24-Jun	12.20	0	0	0.23																														
LS	Portlaoise	PWS	See orig data	1998	24-Jun	12.00	0	0	0.29																														
LS	Portlaoise	PWS	See orig data	1998	24-Jun	14.25	0	0	0.07																														
LS	Portlaoise	PWS	See orig data	1998	30-Jun	13.30	0	0	0.34																														
LS	Portlaoise	PWS	See orig data	1998	30-Jun	13.30	0	0	0.34																														
LS	Portlaoise	PWS	See orig data	1998	4-Aug	12.15	0	0	0.06																														
LS	Portlaoise	PWS	See orig data	1998	4-Aug	12.30	0	0	0.42																														
LS	Portlaoise	PWS	See orig data	1998	4-Aug	12.40	0	0	0.03																														
LS	Portlaoise	PWS	See orig data	1998	4-Aug	14.45	0	0	0.17																														
LS	Portlaoise	PWS	See orig data	1998	1-Sep	9.55	0	0	0.18																														
LS	Portlaoise	PWS	See orig data	1998	1-Sep	10.45	0	0	0.36																														
LS	Portlaoise	PWS	See orig data	1998	1-Sep	11.00	0	0	0.06																														
LS	Portlaoise	PWS	See orig data	1998	1-Sep	14.50	0	0	0.02																														
LS	Portlaoise	PWS	See orig data	1998	9-Sep	11.25	0	0	0.26	<5			0		15.9	7.4		770	17	44	154.8	18.1	9	2.1	0.008		15.9	<0.066	<0.03			Undet						<60	
LS	Portlaoise	PWS	See orig data	1998	9-Sep	11.45	0	0	0.52	<5		0.2	0		15.2	7.7		647	20	16	128.4	13.6	8	1.4	<0.007		20.4	<0.066	<0.03			Undet						<60	
LS	Portlaoise	PWS	See orig data	1998	9-Sep	12.10	0	0	0.11	85		2.1	0		15.7	7.6		233	15	10	57.6	4	5.5	0.8	0.094		5.3	<0.066	<0.03			Undet						530	
LS	Portlaoise	PWS	See orig data	1998	1-Oct	9.45	0	0	0.18																														
LS	Portlaoise	PWS	See orig data	1998	1-Oct	10.10	0	0	0.04																														
LS	Portlaoise	PWS	See orig data	1998	1-Oct	10.20	0	0	0.25																														
LS	Portlaoise	PWS	See orig data	1998	1-Oct	10.45	0	0	0.26																														
LS	Portlaoise	PWS	See orig data	1998	3-Nov	11.00	0	0	0.5																														
LS	Portlaoise	PWS	See orig data	1998	3-Nov	11.15	0	0	0.48																														
LS	Portlaoise	PWS	See orig data	1998	3-Nov	11.30	0	0	0.51																														
LS	Portlaoise	PWS	See orig data	1998	3-Nov	13.00	0	0	0.45																														
LS	Portlaoise	PWS	See orig data	1998	2-Dec	11.27	0	0	0.36																														
LS	Portlaoise	PWS	See orig data	1998	2-Dec	11.40	0	0	0.3																														
LS	Portlaoise	PWS	See orig data	1998	2-Dec	12.10	0	0	0.35																														
LS	Portlaoise	PWS	See orig data	1998	2-Dec	13.00	0	0	0.3																														
LS	Private Well [Attanagh]	SMP	See orig data	1998	18-Aug	11.30	1	0																															
LS	Raheen	GWS	See orig data	1998	12-Aug	11.50	6	0	0.02																														
LS	Raheen	GWS	See orig data	1998	12-Aug	11.50	6	0	0.03																														
LS	Raheen	GWS	See orig data	1998	15-Sep	11.20	6	0	0.06																														
LS	Raheen	GWS	See orig data	1998	7-Oct	11.30	2	0	0.02																														
LS	Raheen	GWS	See orig data	1998	12-Nov	12.30	2	0	0																														
LS	Ralish	GWS	See orig data	1998	12-Aug	11.05	0	0	0.04																														
LS	Ralish	GWS	See orig data	1998	12-Aug	11.05	0	0	0.04																														
LS	Ralish	GWS	See orig data	1998	15-Sep	12.15	0	0	0.1																														
LS	Ralish	GWS	See orig data	1998	7-Oct	12.45	0	0	0.07																														
LS	Ralish	GWS	See orig data	1998	12-Nov	11.30	0	0	0.03																														
LS	Rathdowney	PWS	See orig data	1998	22-Apr	11.46	0	0	0.25	<5		0.8	0		9.5	7.5		748	22	29	104.8	30.8	8.3	1.3			42.3	<0.016	<0.03			Undet						<60	
LS	Rathdowney	PWS	See orig data	1998	14-Jul	12.05	0	0	0.13																														
LS	Rathdowney	PWS	See orig data	1998	14-Jul	12.05	0	0	0.26																														
LS	Rathdowney	PWS	See orig data	1998	11-Aug	11.45	0	0	0.34																														
LS	Rathdowney	PWS	See orig data	1998	11-Aug	11.45	0	0	0.34																														
LS	Rathdowney	PWS	See orig data	1998	1-Sep	14.07	0	0	0.33	<5		0.8	Slight		15.6	7.6		752	19	14	99.6	30	8.1	1.2			25.7	<0.066	<0.03			Undet							
LS	Rathdowney	PWS	See orig data	1998	1-Sep	14.28	0	0	0.37	<5			Slight		17	7.5		753	19	14	98.8	29.4	7.9	1.2			25.7	<0.066	<0.03			Undet							
LS	Rathdowney	PWS	See orig data	1998	9-Sep	11.33	0	0	0.25																														
LS	Rathdowney	PWS	See orig data	1998	6-Oct	11.30	0	0	0.21																														
LS	Rathdowney	PWS	See orig data	1998	3-Nov	10.45	0	0	0.27	<5		<0.1	0		9.6	7.6		748	21	15	104	31.5	8.5	1.3	0.01		26.6	<0.099	<0.26			Undet						<60	
LS	Rathdowney	PWS	See orig data	1998	10-Nov	11.52	0	0	0.28																														
LS	Rathdowney	PWS	See orig data	1998	9-Dec	11.30	0	0	0.22																														
LS	Ratheniska	GWS	See orig data	1998	19-Aug	12.20	0	0	0.35																														
LS	Ratheniska	GWS	See orig data	1998	16-Sep	12.30	0	0	0.3																														

Appendix D: Co Laois Sanitary Authority 1997 Returns to the EPA.

SA	NAME OF WATER SUPPL	CAT	SAMPLE I.D.	YEAR	DAY/MO	TIME	T COLI	F COLI	RES CL	COLOUR	TURB - J	TURB - S	ODOUR	TASTE	TEMP	pH	COND1	COND2	Cl ⁻ ide	SO4	Ca	Mg	Na	K	Al	Dry R	NO3	NO2	NH4	Kj N	Oxid	H2S	SEC	HCBN	PhOH	B	SURF	ORGC1	Fe
LS	Rosenallis	PWS	See orig data	1998	3-Sep	12.01	0	0	0.78																														
LS	Rosenallis	PWS	See orig data	1998	12-Oct	11.25	17	0	0.25																														
LS	Rosenallis	PWS	See orig data	1998	19-Oct	11.30	22	0	0.59																														
LS	Rosenallis	PWS	See orig data	1998	22-Oct	11.45	0	0	0.73																														
LS	Rosenallis	PWS	See orig data	1998	27-Oct	12.15	0	0	0.2																														
LS	Rosenallis	PWS	See orig data	1998	2-Nov	11.50	53	0	0.17																														
LS	Rosenallis	PWS	See orig data	1998	3-Nov	12.30	0	0	0.16	<5		<0.1	0		9.1	7.9		718	26	31	83.6	31.5	22.1	6			3.5	<0.099	<0.26			Undet							<60
LS	Rosenallis	PWS	See orig data	1998	17-Nov	11.00	0	0	0.21																														
LS	Roundwood	GWS	See orig data	1998	11-Aug	12.21	0	0																															
LS	Roundwood	GWS	See orig data	1998	11-Aug	12.21	0	0																															
LS	Roundwood	GWS	See orig data	1998	9-Sep	12.00	2	0																															
LS	Roundwood	GWS	See orig data	1998	6-Oct	12.15	0	0																															
LS	Roundwood	GWS	See orig data	1998	10-Nov	12.45	0	0																															
LS	Shanbeg [Rosenallis]	PWS	See orig data	1998	30-Apr	11.55	1	0		<5			0		7.5		806	25									25.7	<0.013	<0.01			Undet							
LS	Shanbeg [Rosenallis]	PWS	See orig data	1998	22-Jul	12.45	0	0																															
LS	Shanbeg [Rosenallis]	PWS	See orig data	1998	5-Aug	10.55	4	0	0.06																														
LS	Shanbeg [Rosenallis]	PWS	See orig data	1998	5-Aug	11.50	0	0	0.06																														
LS	Shanbeg [Rosenallis]	PWS	See orig data	1998	5-Aug	10.55	0	0	0.1																														
LS	Shanbeg [Rosenallis]	PWS	See orig data	1998	19-Oct	11.45	0	0	0.06																														
LS	Shanbeg [Rosenallis]	PWS	See orig data	1998	3-Nov	14.25	0	0	0.07	<5		0.1	0		8.7	7.2		777	15	14	133.2	11.8	14.4	5			29.7	<0.099	<0.26			Undet						<60	
LS	Shanbeg [Rosenallis]	PWS	See orig data	1998	4-Nov	12.16	0	0	0.12																														
LS	Shanbeg [Rosenallis]	PWS	See orig data	1998	1-Dec	10.00	0	0																															
LS	Stradbally	PWS	See orig data	1998	20-Apr	12.02	0	0	0.24	5		0.4	0		8.9	7.7		645	18	12	120.4	10	8.8	1.3			27.5	<0.013	<0.01			Undet						<60	
LS	Stradbally	PWS	See orig data	1998	8-Jul	11.00	0	0	0.19																														
LS	Stradbally	PWS	See orig data	1998	8-Jul	11.00	0	0	0.26																														
LS	Stradbally	PWS	See orig data	1998	25-Aug	10.00	0	0	0.23																														
LS	Stradbally	PWS	See orig data	1998	1-Sep	13.50	0	0	0.31	<5		<0.1	Slight		15.3	7.8		628	16	12	106	10	8	1.4			18.6	<0.066	<0.03			Undet							
LS	Stradbally	PWS	See orig data	1998	22-Sep	11.20	0	0	0.31																														
LS	Stradbally	PWS	See orig data	1998	20-Oct	11.40	0	0	0.35																														
LS	Stradbally	PWS	See orig data	1998	24-Nov	11.20	0	0	0.28																														
LS	Stradbally	PWS	See orig data	1998	21-Dec	10.45	4	0	0.18																														
LS	The Heath	GWS	See orig data	1998	8-Jul	10.40	0	0	0.31																														
LS	The Heath	GWS	See orig data	1998	8-Jul	10.40	0	0	0.36																														
LS	The Heath	GWS	See orig data	1998	12-Aug	11.45	0	0	0.47																														
LS	The Heath	GWS	See orig data	1998	12-Aug	11.45	0	0	0.72																														
LS	The Heath	GWS	See orig data	1998	15-Sep	11.10	0	0	0.19																														
LS	The Heath	GWS	See orig data	1998	7-Oct	11.45	0	0	0.05																														
LS	The Heath	GWS	See orig data	1998	12-Nov	12.30	0	0	0.25																														
LS	The Strand	PWS	See orig data	1998	8-Jul	12.15	80	0	0.02																														
LS	The Strand	PWS	See orig data	1998	8-Jul	12.15	80	0	0.02																														
LS	The Strand	PWS	See orig data	1998	29-Jul	12.15	0	0	0.19																														
LS	The Strand	PWS	See orig data	1998	29-Jul	12.15	0	0	0.21																														
LS	The Strand	PWS	See orig data	1998	25-Aug	11.05	0	0	0.28																														
LS	The Strand	PWS	See orig data	1998	22-Sep	12.10	0	0	0.15																														
LS	The Strand	PWS	See orig data	1998	20-Oct	12.25	0	0	0.23																														
LS	The Swan	PWS	See orig data	1998	20-Apr	15.06	0	0	0.64	10		0.5	0		10.5	7.6		522	11	36	49.2	28.2	27.8	4			<0.4	<0.013	0.14			Undet						184	
LS	The Swan	PWS	See orig data	1998	19-Aug	11.55	0	0	0.16																														
LS	The Swan	PWS	See orig data	1998	1-Sep	15.35	0	0	0.6			0.2	Slight		16	7.7		525	11	30	44.4	25.7	25.7	3.9			2.7	<0.066	<0.03			Undet							
LS	The Swan	PWS	See orig data	1998	16-Sep	11.00	0	0	0.25																														
LS	The Swan	PWS	See orig data	1998	14-Oct	11.40	0	0	0.08																														
LS	The Swan	PWS	See orig data	1998	17-Nov	12.00	0	0	0.18																														
LS	The Swan	PWS	See orig data	1998	10-Dec	12.40	0	0	0.1																														
LS	Timahoe	PWS	See orig data	1998	22-Apr	11.20	0	0	0.12	5		0.4	0		9.9	7.5		589	14	9	112.4	6.4	9.3	2			20.4	<0.013	<0.01			Undet						<60	
LS	Timahoe	PWS	See orig data	1998	19-Aug	11.30	0	0	0.39																														
LS	Timahoe	PWS	See orig data	1998	1-Sep	12.30	0	0	0.25	<5		0.1	Slight		17	7.7		560	13	10	98	6.3	8.7	1.6			12.8	<0.066	<0.03			Undet							
LS	Timahoe	PWS	See orig data	1998	16-Sep	10.45	0	0	0.17																														
LS	Timahoe	PWS	See orig data	1998	14-Oct	11.20	0	0	0.33																														
LS	Timahoe	PWS	See orig data	1998	17-Nov	11.40	0	0	0.3																														
LS	Timahoe	PWS	See orig data	1998	10-Dec	12.55																																	

Appendix D: Co Laois Sanitary Authority 1997 Returns to the EPA.

NAME OF WATER SUPPLY	CAT	SAMPLE I.D.	YEAR	DAY/MO	TIME	Mn	Cu - 1	Cu - 2	Zn - 1	Zn - 2	PHOS	FLUOR	SS	Ba	Ag	As	Cd	Cn	Cr	Hg	Ni	Pb	Sb	PEST	PAH	STREP	CLOST	T Bact 37	T Bact 22	T BACT	T BACT	TH	ALKAL	AN. DATE	LAB REF	SAMPLING POINT
Abbeyleix	PWS	See orig data	1998	20-Apr	16.31	<20	5		<20			1080	No vis									<3														
Abbeyleix	PWS	See orig data	1998	20-Apr	16.07	<20	10		<20			1200	No vis									<3														
Abbeyleix	PWS	See orig data	1998	30-Jun	12.45																															
Abbeyleix	PWS	See orig data	1998	30-Jun	12.45																															
Abbeyleix	PWS	See orig data	1998	4-Aug	13.10																															
Abbeyleix	PWS	See orig data	1998	5-Aug	13.40																															
Abbeyleix	PWS	See orig data	1998	5-Aug	13.40																															
Abbeyleix	PWS	See orig data	1998	1-Sep	12.00																															
Abbeyleix	PWS	See orig data	1998	1-Sep	12.05																															
Abbeyleix	PWS	See orig data	1998	1-Sep	11.20							700	No vis																							
Abbeyleix	PWS	See orig data	1998	1-Sep	11.40							1000	No vis																							
Abbeyleix	PWS	See orig data	1998	1-Oct	11.15																															
Abbeyleix	PWS	See orig data	1998	1-Oct	11.30																															
Abbeyleix	PWS	See orig data	1998	3-Nov	12.10																															
Abbeyleix	PWS	See orig data	1998	3-Nov	12.15																															
Abbeyleix	PWS	See orig data	1998	2-Dec	11.30																															
Abbeyleix	PWS	See orig data	1998	2-Dec	13.00																															
Arles	PWS	See orig data	1998	20-Apr	14.37	<20	18		31			170	No vis									<3														
Arles	PWS	See orig data	1998	8-Jul	11.45																															
Arles	PWS	See orig data	1998	25-Aug	11.50																															
Arles	PWS	See orig data	1998	22-Sep	11.55																															
Arles	PWS	See orig data	1998	20-Oct	12.10																															
Arles	PWS	See orig data	1998	24-Nov	11.00																															
Arles	PWS	See orig data	1998	21-Dec	11.15																															
Ballacolla	GWS	See orig data	1998	14-Jul	10.40																															
Ballacolla	GWS	See orig data	1998	14-Jul	10.55																															
Ballacolla	GWS	See orig data	1998	14-Jul	11.20																															
Ballacolla	GWS	See orig data	1998	14-Jul	11.40																															
Ballacolla	GWS	See orig data	1998	14-Jul	10.40																															
Ballacolla	GWS	See orig data	1998	14-Jul	10.55																															
Ballacolla	GWS	See orig data	1998	14-Jul	11.20																															
Ballacolla	GWS	See orig data	1998	14-Jul	11.40																															
Ballacolla	GWS	See orig data	1998	18-Aug	9.50																															
Ballacolla	GWS	See orig data	1998	18-Aug	10.00																															
Ballacolla	GWS	See orig data	1998	18-Aug	10.10																															
Ballacolla	GWS	See orig data	1998	18-Aug	10.30																															
Ballacolla	GWS	See orig data	1998	8-Sep	11.00																															
Ballacolla	GWS	See orig data	1998	8-Sep	11.10																															
Ballacolla	GWS	See orig data	1998	8-Sep	11.20																															
Ballacolla	GWS	See orig data	1998	8-Sep	11.40																															
Ballacolla	GWS	See orig data	1998	13-Oct	10.50																															
Ballacolla	GWS	See orig data	1998	13-Oct	10.55																															
Ballacolla	GWS	See orig data	1998	13-Oct	11.00																															
Ballacolla	GWS	See orig data	1998	13-Oct	11.25																															
Ballacolla	GWS	See orig data	1998	25-Nov	11.30																															
Ballacolla	GWS	See orig data	1998	25-Nov	11.45																															
Ballacolla	GWS	See orig data	1998	25-Nov	12.00																															
Ballacolla	GWS	See orig data	1998	25-Nov	12.15																															
Ballinakill (Cloghogue/Fermo	PWS	See orig data	1998	22-Apr	14.40	<20	5		<20			540	No vis									<3														
Ballinakill (Cloghogue/Fermo	PWS	See orig data	1998	30-Jun	13.00																															
Ballinakill (Cloghogue/Fermo	PWS	See orig data	1998	30-Jun	13.00																															
Ballinakill (Cloghogue/Fermo	PWS	See orig data	1998	4-Aug	13.25																															
Ballinakill (Cloghogue/Fermo	PWS	See orig data	1998	1-Sep	10.55							100	No vis																							
Ballinakill (Cloghogue/Fermo	PWS	See orig data	1998	1-Sep	11.40																															
Ballinakill (Cloghogue/Fermo	PWS	See orig data	1998	1-Oct	11.40																															
Ballinakill (Cloghogue/Fermo	PWS	See orig data	1998	3-Nov	12.30																															
Ballinakill (Cloghogue/Fermo	PWS	See orig data	1998	12-Aug	12.05																															
Ballybrittas	GWS	See orig data	1998	20-Apr	14.03	<20	8		26			170	No vis									<3														
Ballylinan	PWS	See orig data	1998	8-Jul	11.30																															
Ballylinan	PWS	See orig data	1998	29-Jul	11.50																															
Ballylinan	PWS	See orig data	1998	29-Jul	11.50																															
Ballylinan	PWS	See orig data	1998	1-Sep	15.00							200	No vis																							
Ballylinan	PWS	See orig data	1998	22-Sep	11.45																															
Ballylinan	PWS	See orig data	1998	20-Oct	12.00																															
Ballylinan	PWS	See orig data	1998	24-Nov	11.45																															
Ballylinan	PWS	See orig data	1998	21-Dec	11.00																															
Ballyroan	PWS	See orig data	1998	20-Apr	15.40	<20	6		<20			150	No vis									<3														
Ballyroan	PWS	See orig data	1998	4-Aug	13.00																															

Appendix D: Co Laois Sanitary Authority 1997 Returns to the EPA.

NAME OF WATER SUPPLY	CAT	SAMPLE I.D.	YEAR	DAY/MO	TIME	Mn	Cu - 1	Cu - 2	Zn - 1	Zn - 2	PHOS	FLUOR	SS	Ba	Ag	As	Cd	CN	Cr	Hg	Ni	Pb	Sb	PEST	PAH	STREP	CLOST	T Bact 37	T Bact 22	T BACT	T BACT	TH	ALKAL	AN. DATE	LAB REF	SAMPLING POINT
Ballyroan	PWS	See orig data	1998	1-Sep	11.25																															
Ballyroan	PWS	See orig data	1998	1-Sep	12.05							200	No vis																							
Ballyroan	PWS	See orig data	1998	1-Oct	11.05																															
Ballyroan	PWS	See orig data	1998	3-Nov	11.50																															
Ballyroan	PWS	See orig data	1998	2-Dec	12.30																															
Borris-in-Ossory	PWS	See orig data	1998	22-Apr	10.59	<20	21		56			510	No vis									<3														
Borris-in-Ossory	PWS	See orig data	1998	30-Jun	12.10																															
Borris-in-Ossory	PWS	See orig data	1998	30-Jun	12.10																															
Borris-in-Ossory	PWS	See orig data	1998	11-Aug	11.31																															
Borris-in-Ossory	PWS	See orig data	1998	11-Aug	11.35																															
Borris-in-Ossory	PWS	See orig data	1998	9-Sep	11.10																															
Borris-in-Ossory	PWS	See orig data	1998	6-Oct	11.25																															
Borris-in-Ossory	PWS	See orig data	1998	3-Nov	11.25	20			64			<100	No vis																							
Borris-in-Ossory	PWS	See orig data	1998	10-Nov	11.30																															
Borris-in-Ossory	PWS	See orig data	1998	9-Dec	13.10																															
Clonaslee	PWS	See orig data	1998	21-Apr	11.43	<20	4		84			880	No vis									<3														
Clonaslee	PWS	See orig data	1998	22-Jul	12.15																															
Clonaslee	PWS	See orig data	1998	22-Jul	12.15																															
Clonaslee	PWS	See orig data	1998	29-Jul	14.05																															
Clonaslee	PWS	See orig data	1998	29-Jul	14.05																															
Clonaslee	PWS	See orig data	1998	3-Sep	11.40																															
Clonaslee	PWS	See orig data	1998	14-Oct	11.15																															
Clonaslee	PWS	See orig data	1998	3-Nov	13.55	20			<60			700	No vis																							
Clonaslee	PWS	See orig data	1998	4-Nov	11.45																															
Clonaslee	PWS	See orig data	1998	1-Dec	10.30																															
Cullohill	GWS	See orig data	1998	18-Aug	10.50																															
Cullohill	GWS	See orig data	1998	8-Sep	12.00																															
Cullohill	GWS	See orig data	1998	13-Oct	12.40																															
Cullohill	GWS	See orig data	1998	18-Nov	11.20																															
Donaghmore	GWS	See orig data	1998	14-Jul	12.25																															
Donaghmore	GWS	See orig data	1998	14-Jul	11.55																															
Donaghmore	GWS	See orig data	1998	10-Aug	11.20																															
Donaghmore	GWS	See orig data	1998	11-Aug	12.05																															
Donaghmore	GWS	See orig data	1998	11-Aug	11.20																															
Donaghmore	GWS	See orig data	1998	9-Sep	11.20																															
Donaghmore	GWS	See orig data	1998	6-Oct	11.45																															
Donaghmore	GWS	See orig data	1998	10-Nov	11.30																															
Durrow	PWS	See orig data	1998	22-Apr	14.09	<20	4		<20			590	No vis									4														
Durrow	PWS	See orig data	1998	30-Jun	15.00																															
Durrow	PWS	See orig data	1998	30-Jun	15.00																															
Durrow	PWS	See orig data	1998	14-Jul	13.50																															
Durrow	PWS	See orig data	1998	14-Jul	13.50																															
Durrow	PWS	See orig data	1998	18-Aug	11.15																															
Durrow	PWS	See orig data	1998	18-Aug	11.40																															
Durrow	PWS	See orig data	1998	8-Sep	12.15																															
Durrow	PWS	See orig data	1998	8-Sep	12.25																															
Durrow	PWS	See orig data	1998	9-Sep	16.00	<20			<20			200	No vis																							
Durrow	PWS	See orig data	1998	13-Oct	11.40																															
Durrow	PWS	See orig data	1998	13-Oct	11.40																															
Durrow	PWS	See orig data	1998	18-Nov	11.30																															
Durrow	PWS	See orig data	1998	18-Nov	11.50																															
Durrow	PWS	See orig data	1998	25-Nov	12.30																															
Durrow	PWS	See orig data	1998	10-Dec	11.40																															
Durrow	PWS	See orig data	1998	10-Dec	11.50																															
Emo	PWS	See orig data	1998	3-Nov	15.20	20			31			200	No vis																							
Errill	PWS	See orig data	1998	14-Jul	12.50																															
Errill	PWS	See orig data	1998	10-Aug	12.30																															
Errill	PWS	See orig data	1998	11-Aug	12.30																															
Errill	PWS	See orig data	1998	11-Aug	12.30																															
Errill	PWS	See orig data	1998	9-Sep	12.15																															
Errill	PWS	See orig data	1998	6-Oct	12.20																															
Errill	PWS	See orig data	1998	10-Nov	11.50																															
Errill	PWS	See orig data	1998	8-Dec	12.05																															
Graigecullen	PWS	See orig data	1998	22-Apr	16.00	<20	5		<20			1480	No vis									<3														
Graigecullen	PWS	See orig data	1998	8-Jul	12.50																															
Graigecullen	PWS	See orig data	1998	25-Aug	11.20																															
Graigecullen	PWS	See orig data	1998	22-Sep	12.30																															
Graigecullen	PWS	See orig data	1998	20-Oct	12.45																															

Appendix D: Co Laois Sanitary Authority 1997 Returns to the EPA.

NAME OF WATER SUPPLY	CAT	SAMPLE I.D.	YEAR	DAY/MO	TIME	Mn	Cu - 1	Cu - 2	Zn - 1	Zn - 2	PHOS	FLUOR	SS	Ba	Ag	As	Cd	CN	Cr	Hg	Ni	Pb	Sb	PEST	PAH	STREP	CLOST	T Bact 37	T Bact 22	T BACT	T BACT	TH	ALKAL	AN. DATE	LAB REF	SAMPLING POINT
Graigecullen	PWS	See orig data	1998	24-Nov	12.15																															
Graigecullen	PWS	See orig data	1998	20-Dec	11.30																															
Killeaney	GWS	See orig data	1998	12-Aug	12.30																															
Killeaney	GWS	See orig data	1998	12-Aug	12.30																															
Killeaney	GWS	See orig data	1998	15-Sep	12.00																															
Killeaney	GWS	See orig data	1998	7-Oct	12.20																															
Killenard	GWS	See orig data	1998	12-Aug	12.00																															
Killenard	GWS	See orig data	1998	12-Aug																																
Killenard	GWS	See orig data	1998	15-Sep	11.45																															
Killenard	GWS	See orig data	1998	7-Oct	12.10																															
Mountmellick	PWS	See orig data	1998	21-Apr	13.42	<20	25		<20			930	No vis									12														
Mountmellick	PWS	See orig data	1998	24-Jun	12.45																															
Mountmellick	PWS	See orig data	1998	24-Jun	12.45																															
Mountmellick	PWS	See orig data	1998	24-Jun	12.45																															
Mountmellick	PWS	See orig data	1998	22-Jul	13.00																															
Mountmellick	PWS	See orig data	1998	22-Jul	13.15																															
Mountmellick	PWS	See orig data	1998	22-Jul	13.00																															
Mountmellick	PWS	See orig data	1998	22-Jul	13.15																															
Mountmellick	PWS	See orig data	1998	5-Aug	11.10																															
Mountmellick	PWS	See orig data	1998	5-Aug	11.20																															
Mountmellick	PWS	See orig data	1998	5-Aug	10.45																															
Mountmellick	PWS	See orig data	1998	5-Aug	10.55																															
Mountmellick	PWS	See orig data	1998	3-Sep	12.22																															
Mountmellick	PWS	See orig data	1998	3-Sep	12.30																															
Mountmellick	PWS	See orig data	1998	9-Sep	12.45	<20			<20			900	No vis																							
Mountmellick	PWS	See orig data	1998	14-Oct	11.45																															
Mountmellick	PWS	See orig data	1998	14-Oct	11.55																															
Mountmellick	PWS	See orig data	1998	4-Nov	12.15																															
Mountmellick	PWS	See orig data	1998	4-Nov	12.15																															
Mountmellick	PWS	See orig data	1998	1-Dec	11.30																															
Mountmellick	PWS	See orig data	1998	1-Dec	11.45																															
Mountrath	PWS	See orig data	1998	22-Apr	12.18	<20	9		41			1530	No vis									23														
Mountrath	PWS	See orig data	1998	30-Jun	11.51																															
Mountrath	PWS	See orig data	1998	11-Aug	11.55																															
Mountrath	PWS	See orig data	1998	11-Aug	12.06																															
Mountrath	PWS	See orig data	1998	11-Aug	12.06																															
Mountrath	PWS	See orig data	1998	11-Aug	11.55																															
Mountrath	PWS	See orig data	1998	9-Sep	11.35																															
Mountrath	PWS	See orig data	1998	9-Sep	11.35																															
Mountrath	PWS	See orig data	1998	6-Oct	12.00																															
Mountrath	PWS	See orig data	1998	6-Oct	11.50																															
Mountrath	PWS	See orig data	1998	3-Nov	11.50	20			20			800	No vis																							
Mountrath	PWS	See orig data	1998	10-Nov	12.30																															
Mountrath	PWS	See orig data	1998	10-Nov	12.15																															
Mountrath	PWS	See orig data	1998	8-Dec	13.05																															
Mountrath	PWS	See orig data	1998	8-Dec	13.45																															
Portarlinton	PWS	See orig data	1998	21-Apr	15.10	<20	5		27			1070	No vis									<3														
Portarlinton	PWS	See orig data	1998	21-Apr	14.40	<20	8		55			1060	No vis									3														
Portarlinton	PWS	See orig data	1998	24-Jun	13.05																															
Portarlinton	PWS	See orig data	1998	24-Jun	13.20																															
Portarlinton	PWS	See orig data	1998	24-Jun	13.20																															
Portarlinton	PWS	See orig data	1998	5-Aug	11.50																															
Portarlinton	PWS	See orig data	1998	5-Aug	12.05																															
Portarlinton	PWS	See orig data	1998	5-Aug	11.50																															
Portarlinton	PWS	See orig data	1998	5-Aug	12.05																															
Portarlinton	PWS	See orig data	1998	3-Sep	12.35																															
Portarlinton	PWS	See orig data	1998	3-Sep	12.15																															
Portarlinton	PWS	See orig data	1998	9-Sep	14.30	<20			<20			900	No vis																							
Portarlinton	PWS	See orig data	1998	9-Sep	14.50	<20			39			900	No vis																							
Portarlinton	PWS	See orig data	1998	14-Oct	12.25																															
Portarlinton	PWS	See orig data	1998	14-Oct	12.35																															
Portarlinton	PWS	See orig data	1998	4-Nov	12.30																															
Portarlinton	PWS	See orig data	1998	4-Nov	12.45																															
Portarlinton	PWS	See orig data	1998	1-Dec	12.09																															
Portarlinton	PWS	See orig data	1998	1-Dec	12.05																															
Portlaoise	PWS	See orig data	1998	21-Apr	15.41	<20	13		63			250	No vis									<3														
Portlaoise	PWS	See orig data	1998	21-Apr	16.06	<20	4		53			270	No vis									<3														
Portlaoise	PWS	See orig data	1998	21-Apr	16.41	<20	10		57			3																								

Appendix D: Co Laois Sanitary Authority 1997 Returns to the EPA.

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Appendix D: Co Laois Sanitary Authority 1997 Returns to the EPA.

NAME OF WATER SUPPLY	CAT	SAMPLE I.D.	YEAR	DAY/MO	TIME	Mn	Cu - 1	Cu - 2	Zn - 1	Zn - 2	PHOS	FLUOR	SS	Ba	Ag	As	Cd	CN	Cr	Hg	Ni	Pb	Sb	PEST	PAH	STREP	CLOST	T Bact 37	T Bact 22	T BACT	T BACT	TH	ALKAL	AN. DATE	LAB REF	SAMPLING POINT
Rosenallis	PWS	See orig data	1998	3-Sep	12.01																															
Rosenallis	PWS	See orig data	1998	12-Oct	11.25																															
Rosenallis	PWS	See orig data	1998	19-Oct	11.30																															
Rosenallis	PWS	See orig data	1998	22-Oct	11.45																															
Rosenallis	PWS	See orig data	1998	27-Oct	12.15																															
Rosenallis	PWS	See orig data	1998	2-Nov	11.50																															
Rosenallis	PWS	See orig data	1998	3-Nov	12.30	20				21		<100	No vis																							
Rosenallis	PWS	See orig data	1998	17-Nov	11.00																															
Roundwood	GWS	See orig data	1998	11-Aug	12.21																															
Roundwood	GWS	See orig data	1998	11-Aug	12.21																															
Roundwood	GWS	See orig data	1998	9-Sep	12.00																															
Roundwood	GWS	See orig data	1998	6-Oct	12.15																															
Roundwood	GWS	See orig data	1998	10-Nov	12.45																															
Shanbeg [Rosenallis]	PWS	See orig data	1998	30-Apr	11.55								No vis																							
Shanbeg [Rosenallis]	PWS	See orig data	1998	22-Jul	12.45																															
Shanbeg [Rosenallis]	PWS	See orig data	1998	5-Aug	10.55																															
Shanbeg [Rosenallis]	PWS	See orig data	1998	5-Aug	11.50																															
Shanbeg [Rosenallis]	PWS	See orig data	1998	5-Aug	10.55																															
Shanbeg [Rosenallis]	PWS	See orig data	1998	19-Oct	11.45																															
Shanbeg [Rosenallis]	PWS	See orig data	1998	3-Nov	14.25	20				51		<100	No vis																							
Shanbeg [Rosenallis]	PWS	See orig data	1998	4-Nov	12.16																															
Shanbeg [Rosenallis]	PWS	See orig data	1998	1-Dec	10.00																															
Stradbally	PWS	See orig data	1998	20-Apr	12.02	<20	8		<20			180	No vis									17														
Stradbally	PWS	See orig data	1998	8-Jul	11.00																															
Stradbally	PWS	See orig data	1998	8-Jul	11.00																															
Stradbally	PWS	See orig data	1998	25-Aug	10.00																															
Stradbally	PWS	See orig data	1998	1-Sep	13.50							300	No vis																							
Stradbally	PWS	See orig data	1998	22-Sep	11.20																															
Stradbally	PWS	See orig data	1998	20-Oct	11.40																															
Stradbally	PWS	See orig data	1998	24-Nov	11.20																															
Stradbally	PWS	See orig data	1998	21-Dec	10.45																															
The Heath	GWS	See orig data	1998	8-Jul	10.40																															
The Heath	GWS	See orig data	1998	8-Jul	10.40																															
The Heath	GWS	See orig data	1998	12-Aug	11.45																															
The Heath	GWS	See orig data	1998	12-Aug	11.45																															
The Heath	GWS	See orig data	1998	15-Sep	11.10																															
The Heath	GWS	See orig data	1998	7-Oct	11.45																															
The Heath	GWS	See orig data	1998	12-Nov	12.30																															
The Strand	PWS	See orig data	1998	8-Jul	12.15																															
The Strand	PWS	See orig data	1998	8-Jul	12.15																															
The Strand	PWS	See orig data	1998	29-Jul	12.15																															
The Strand	PWS	See orig data	1998	29-Jul	12.15																															
The Strand	PWS	See orig data	1998	25-Aug	11.05																															
The Strand	PWS	See orig data	1998	22-Sep	12.10																															
The Strand	PWS	See orig data	1998	20-Oct	12.25																															
The Swan	PWS	See orig data	1998	20-Apr	15.06	148	2		<20			160	No vis									<3														
The Swan	PWS	See orig data	1998	19-Aug	11.55																															
The Swan	PWS	See orig data	1998	1-Sep	15.35							200	No vis																							
The Swan	PWS	See orig data	1998	16-Sep	11.00																															
The Swan	PWS	See orig data	1998	14-Oct	11.40																															
The Swan	PWS	See orig data	1998	17-Nov	12.00																															
The Swan	PWS	See orig data	1998	10-Dec	12.40																															
Timahoe	PWS	See orig data	1998	22-Apr	11.20	<20	10		136			170	No vis									4														
Timahoe	PWS	See orig data	1998	19-Aug	11.30																															
Timahoe	PWS	See orig data	1998	1-Sep	12.30							200	No vis																							
Timahoe	PWS	See orig data	1998	16-Sep	10.45																															
Timahoe	PWS	See orig data	1998	14-Oct	11.20																															
Timahoe	PWS	See orig data	1998	17-Nov	11.40																															
Timahoe	PWS	See orig data	1998	10-Dec	12.55																															
Vicarstown	PWS	See orig data	1998	20-Apr	13.17	46	7		180			270										<3														
Vicarstown	PWS	See orig data	1998	29-Jul	11.20																															
Vicarstown	PWS	See orig data	1998	29-Jul	11.20																															
Vicarstown	PWS	See orig data	1998	1-Sep	14.20							200																								
Vicarstown	PWS	See orig data	1998	22-Sep	10.35																															
Vicarstown	PWS	See orig data	1998	20-Oct	10.12																															
Vicarstown	PWS	See orig data	1998	24-Nov	10.45																															
Vicarstown	PWS	See orig data	1998	25-Nov	16.15																															
Vicarstown	PWS	See orig data	1998	21-Dec	10.00																															

APPENDIX E

Appendix E: EPA Sampling and Analytical Data. Selected Groundwater Supply Sources in County Laois

COU	COUNTY	PLOT_NO	LOCATION	DATE	YEAR	GEOLOGY	AQUIFER_UN	WRREGION	TYPE	DEPTH	LAB	LAB_REF	SCHEME	DETAILS	SAMPLER	NGR	EASTING	NORTHING	RUN_NO	ANLSIS_DAT	FIELD21	TIME	PH	TEMP(O_C)	ODOUR
Laois		1	Abbeyleix	12/5/1995	1995		SE 8	South-Eastern			DUB	3890				S452841	245200	184100	2				7.22	nda	
Laois		1	Abbeyleix	8/21/1996	1996		SE 8	South-Eastern			DUB	2962				S452841	245200	184100	1				7.17	nda	
Laois		1	Abbeyleix	11/20/1996	1996		SE 8	South-Eastern			DUB	4086				S452841	245200	184100	2				7.31	10	
Laois		1	Abbeyleix	10/30/1997	1997		SE 8	South-Eastern			DUB	4265				S452841	245200	184100	1				7.29	11.5	
Laois		1	Abbeyleix	2/11/1998	1997		SE 8	South-Eastern			DUB	656				S452841	245200	184100	2				7.29	8.8	
Laois		2	Abbeyleix	12/5/1995	1995		SE 8	South-Eastern			DUB	3892				S458835	245800	183500	2				7.18	nda	
Laois		2	Abbeyleix	8/21/1996	1996		SE 8	South-Eastern			DUB	2964				S458835	245800	183500	1				6.96	nda	
Laois		2	Abbeyleix	11/20/1996	1996		SE 8	South-Eastern			DUB	4087				S458835	245800	183500	2				7.24	9	
Laois		2	Abbeyleix	10/30/1997	1997		SE 8	South-Eastern			DUB	4267				S458835	245800	183500	1				7.25	10.8	
Laois		2	Abbeyleix	2/11/1998	1997		SE 8	South-Eastern			DUB	658				S458835	245800	183500	2				7.25	10	
Laois		3	Abbeyleix	12/5/1995	1995		SE 8	South-Eastern			DUB	3891				S459839	245900	183900	2				7.25	nda	
Laois		3	Abbeyleix	8/21/1996	1996		SE 8	South-Eastern			DUB	2963				S459839	245900	183900	1				7.19	nda	
Laois		3	Abbeyleix	11/20/1996	1996		SE 8	South-Eastern			DUB	4088				S459839	245900	183900	2				7.28	9	
Laois		3	Abbeyleix	10/30/1997	1997		SE 8	South-Eastern			DUB	4266				S459839	245900	183900	1				7.32	10.3	
Laois		3	Abbeyleix	2/11/1998	1997		SE 8	South-Eastern			DUB	657				S459839	245900	183900	2				7.32	9.6	
Laois		5	Athy Town WS	8/22/1996	1996		SE 5	South-Eastern			DUB	2992				S602839	260200	183900	1				6.85	nda	
Laois		5	Athy Town WS	11/21/1996	1996		SE 5	South-Eastern			DUB	4098		DirectFromPipe		S602839	260200	183900	2				6.93	9	
Laois		5	Athy Town WS	11/3/1997	1997		SE 5	South-Eastern			DUB	4281				S602839	260200	183900	1				6.76	10.6	
Laois		5	Athy Town WS	2/12/1998	1997		SE 5	South-Eastern			DUB	681				S602839	260200	183900	2				7.46	9.3	
Laois		13	Coolenaugh	8/22/1996	1996		SE 5	South-Eastern			DUB	2993				S678836	267800	183600	1				7.29	nda	
Laois		13	Coolenaugh	11/21/1996	1996		SE 5	South-Eastern			DUB	4099		TapinHouseonMain		S678836	267800	183600	2				7.28	7	
Laois		13	Coolenaugh	11/3/1997	1997		SE 5	South-Eastern			DUB	4282				S678836	267800	183600	1				7.43	12.3	
Laois		13	Coolenaugh	2/12/1998	1997		SE 5	South-Eastern			DUB	682				S678836	267800	183600	2				7.43	10.7	
Laois		23	Portlaoise WS	12/5/1995	1995		SE 4	South-Eastern			DUB	3893				N494019	249400	201900	2				7.25	nda	
Laois		23	Portlaoise WS	8/21/1996	1996		SE 4	South-Eastern			DUB	2965				N494019	249400	201900	1				7.1	nda	
Laois		23	Portlaoise WS	11/20/1996	1996		SE 4	South-Eastern			DUB	4089		FromWellSurface		N494019	249400	201900	2				7.39	10	
Laois		23	Portlaoise WS	10/30/1997	1997		SE 4	South-Eastern			DUB	4268				N494019	249400	201900	1				7.3	11.3	
Laois		23	Portlaoise WS	2/11/1998	1997		SE 4	South-Eastern			DUB	659				N494019	249400	201900	2				7.36	10.7	
Laois		28	Swan Ntwn Doonane	8/22/1996	1996		SE 8	South-Eastern			DUB	2991				S564824	256400	182400	1				7.69	nda	
Laois		28	Swan Ntwn Doonane	11/21/1996	1996		SE 8	South-Eastern			DUB	4097				S564824	256400	182400	2				7.51	9.5	
Laois		28	Swan Ntwn Doonane	11/3/1997	1997		SE 8	South-Eastern			DUB	4280				S564824	256400	182400	1				7.55	11.1	
Laois		28	Swan Ntwn Doonane	2/12/1998	1997		SE 8	South-Eastern			DUB	680				S564824	256400	182400	2				7.77	11.6	
Laois		37	Donoghmore	12/5/1995	1995		SE 7	South-Eastern			DUB	3889				S260850	226000	185000	2				7.56	nda	
Laois		37	Donoghmore	8/21/1996	1996		SE 7	South-Eastern			DUB	2959				S260850	226000	185000	1				7.3	nda	
Laois		37	Donoghmore	11/20/1996	1996		SE 7	South-Eastern			DUB	4082		TaponPressureTank		S260850	226000	185000	2				7.55	11	
Laois		37	Donoghmore	10/30/1997	1997		SE 7	South-Eastern			DUB	4263				S260850	226000	185000	1				7.6	12.7	
Laois		37	Donoghmore	2/11/1998	1997		SE 7	South-Eastern			DUB	653				S260850	226000	185000	2				7.54	12.3	
Laois		39	Fermoyle	8/21/1996	1996		SE 8	South-Eastern			DUB	2961				S361791	236100	179100	1				7.3	nda	
Laois		39	Fermoyle	11/20/1996	1996		SE 8	South-Eastern			DUB	4085		TaponMain		S361791	236100	179100	2				7.32	9	
Laois		39	Fermoyle	10/30/1997	1997		SE 8	South-Eastern			DUB	4264				S361791	236100	179100	1				7.38	10.6	
Laois		39	Fermoyle	2/11/1998	1997		SE 8	South-Eastern			DUB	655				S361791	236100	179100	2				7.49	10.6	
Laois		40	Knocks	8/21/1996	1996		SE 7	South-Eastern			DUB	2958				N370001	237000	200100	1				7.17	nda	
Laois		40	Knocks	11/20/1996	1996		SE 7	South-Eastern			DUB	4083		FromRisingMainDischa		N370001	237000	200100	2				7.4	4	
Laois		40	Knocks	10/30/1997	1997		SE 7	South-Eastern			DUB	4262				N370001	237000	200100	1				7.18	9.7	
Laois		40	Knocks	2/11/1998	1997		SE 7	South-Eastern			DUB	660				N370001	237000	200100	2				7.6	9.1	

Appendix E: EPA Sampling and Analytical Data. Selected Groundwater Supply Sources in County Laois

LOCATION	DATE	YEAR	BOD(MG/L O	COLOUR(HAZ	CONDUCT(US	TDS (MG/L	SUS SLDS(M	TURBIDITY(	TOC(MG/L C	AMMONIA(MG	O-PHOSPHAT	TON(MG/L N	NITRATE (M	NITRATE(MG	NITRITE (M	ALKALINITY	CHLORIDE(M	FLOURIDE (
Abbeyleix	12/5/1995	1995			727						0.008	6.5	6.180	27.365	nda	275.00	18	
Abbeyleix	8/21/1996	1996			724						0.010	6.397			nda	372.00	18	
Abbeyleix	11/20/1996	1996			751						0.009	6.25			nda	362.00	16	
Abbeyleix	10/30/1997	1997			629						0.006	5.876			nda	364.00	15	
Abbeyleix	2/11/1998	1997			650						0.005	6.609			nda	340.00	14	
Abbeyleix	12/5/1995	1995			719						0.009	5.65	5.390	23.867	nda	273.00	16	
Abbeyleix	8/21/1996	1996			716						0.010	5.339			nda	368.00	16	
Abbeyleix	11/20/1996	1996			739						0.009	5.71			nda	334.00	15	
Abbeyleix	10/30/1997	1997			611						0.006	5.378			nda	354.00	15	
Abbeyleix	2/11/1998	1997			651						0.007	5.82			nda	338.00	16	
Abbeyleix	12/5/1995	1995			699						0.011	7.4	6.980	30.907	nda	251.00	19	
Abbeyleix	8/21/1996	1996			702						0.010	7.571			nda	360.00	21	
Abbeyleix	11/20/1996	1996			737						0.009	7.75			nda	324.00	19	
Abbeyleix	10/30/1997	1997			603						0.006	7.502			nda	322.00	18	
Abbeyleix	2/11/1998	1997			615						0.006	7.086			nda	316.00	16	
Athy Town WS	8/22/1996	1996			433					0.048	0.004	2.506			nda	160.00	14	
Athy Town WS	11/21/1996	1996			386					0.118	0.026	0.024			nda	180.00	11	
Athy Town WS	11/3/1997	1997			351					0.055	0.010	<0.01			nda	154.00	11	
Athy Town WS	2/12/1998	1997			421					0.011	0.018	0.089			nda	234.00	17	
Coolenaugh	8/22/1996	1996			661						0.027	2.74			nda	304.00	16	
Coolenaugh	11/21/1996	1996			671						0.027	2.893			nda	302.00	16	
Coolenaugh	11/3/1997	1997			559						0.029	2.968			nda	304.00	16	
Coolenaugh	2/12/1998	1997			515						0.025	3.049			nda	284.00	15	
Portlaoise WS	12/5/1995	1995			631					0.012	0.025	4.533	4.520	20.015	nda	228.00	18	
Portlaoise WS	8/21/1996	1996			666						0.019	5.38			nda	302.00	21	
Portlaoise WS	11/20/1996	1996			668					0.020	0.029	3.838			nda	306.00	17	
Portlaoise WS	10/30/1997	1997			591						0.024	7.518			nda	306.00	20	
Portlaoise WS	2/11/1998	1997			634						0.022	8.56			nda	298.00	20	
Swan Ntwn Doonane	8/22/1996	1996			512					0.106	0.042	0.026			nda	238.00	8	
Swan Ntwn Doonane	11/21/1996	1996			512					0.099	0.012	<0.01			nda	242.00	8	
Swan Ntwn Doonane	11/3/1997	1997			434					0.115	0.010	<0.01			nda	242.00	8	
Swan Ntwn Doonane	2/12/1998	1997			409					0.102	0.011	<.01			nda	232.00	10	
Donoghmore	12/5/1995	1995			663						0.006	0.865	0.800	3.542	nda	232.10	16	
Donoghmore	8/21/1996	1996			682						0.012	1.598			nda	342.00	16	
Donoghmore	11/20/1996	1996			696						0.011	2.23			nda	328.00	14	
Donoghmore	10/30/1997	1997			546						0.007	0.838			nda	334.00	24	
Donoghmore	2/11/1998	1997			599							0.778			nda	328.00	14	
Fermoye	8/21/1996	1996			777						0.010	7.775			nda	354.00	27	
Fermoye	11/20/1996	1996			800						0.011	12.528			nda	314.00	24	
Fermoye	10/30/1997	1997			683						0.008	11.109			nda	344.00	21	
Fermoye	2/11/1998	1997			695						0.008	11.776			nda	318.00	22	
Knocks	8/21/1996	1996			376						0.010	1.964			nda	164.00	16	
Knocks	11/20/1996	1996			394						0.010	2.35			nda	170.00	12	
Knocks	10/30/1997	1997			284						0.008	2.31			nda	144.00	20	
Knocks	2/11/1998	1997			330						0.006	2.43			nda	160.00	12	

Appendix E: EPA Sampling and Analytical Data. Selected Groundwater Supply Sources in County Laois

LOCATION	DATE	YEAR	TOTL HARD(	CA HARDNES	MG HARDNES	COLIFORMS/	FAECAL COL	SULPHATE(M	SULPHIDE(M	SODIUM(MG/	POTASSIUM(	MAGNESIUM(	COPPER(MG/	CALCIUM(MG	IRON(MG/L	MANGANESE(	ALUMINIUM(	ZINC(MG/L
Abbeyleix	12/5/1995	1995				nda	nda	16.39		8.95	1.97	14.08		126.85	0.248	<0.0005		
Abbeyleix	8/21/1996	1996				nda	nda	15.5		8.38	2.01	13.31		138.1	0.101	<0.0005		
Abbeyleix	11/20/1996	1996				nda	nda	15.21		9.04	2.52	9.8		136.5	0.004	<0.0005		
Abbeyleix	10/30/1997	1997				nda	nda	13.645		8.265	1.13	13.95		136.595		0.0008		
Abbeyleix	2/11/1998	1997				nda	nda	13.6		8.5	1.6	13.8		132	0.007	<0.0005		
Abbeyleix	12/5/1995	1995				nda	nda	13.18		7.98	1.62	12.32		127.1	0.439	<0.0005		
Abbeyleix	8/21/1996	1996				nda	nda	12.71		8.51	1.4	11.88		138.7	0.309	<0.0005		
Abbeyleix	11/20/1996	1996				nda	nda	12.79		7.55	8.33	8.42		136.8	0.021	0.0006		
Abbeyleix	10/30/1997	1997				nda	nda	11.23		7.54	0.635	12.49		135.98	0.017	<0.0005		
Abbeyleix	2/11/1998	1997				nda	nda	12.5		8.2	1.3	12.7		133.3	0.002	<0.0005		
Abbeyleix	12/5/1995	1995				nda	nda	12.71		8.11	1.32	13.33		119.93	0.383	<0.0005		
Abbeyleix	8/21/1996	1996				nda	nda	13.04		8.22	1.38	12.97		133.3	0.132	<0.0005		
Abbeyleix	11/20/1996	1996				nda	nda	13.03		8.18	1.4	9.7		132.8	0.007	<0.0005		
Abbeyleix	10/30/1997	1997				nda	nda	11.015		8.395	0.815	13.7		127.96		<0.0005		
Abbeyleix	2/11/1998	1997				nda	nda	10.1		8.2	1.1	13.1		122.8	0.007	<0.0005		
Athy Town WS	8/22/1996	1996				nda	nda	36.41		16.41	3.34	16.06		37.21	3.778	0.6885		
Athy Town WS	11/21/1996	1996				nda	nda	40.25		17.89	3.81	13.82		39.36	6.339	0.744		
Athy Town WS	11/3/1997	1997				nda	nda	39.84		15.805	2.54	17.06		38.175	3.779	0.68		
Athy Town WS	2/12/1998	1997				nda	nda	14.2		21.4	2.4	17.1		66.9	7.740	0.14		
Coolenaugh	8/22/1996	1996				nda	nda	24.52		8.45	1.12	13.34		111.36	0.140	0.0018		
Coolenaugh	11/21/1996	1996				nda	nda	24.72		10.13	1.09	10.28		122.5	0.017	0.0092		
Coolenaugh	11/3/1997	1997				nda	nda	17.89		8.875	0.58	17.395		108.695	0.037	0.0025		
Coolenaugh	2/12/1998	1997				nda	nda	16.8		9.2	1.3	14.7		108.2	0.050	<0.0005		
Portlaoise WS	12/5/1995	1995				nda	nda	26.29		9.3	3.18	9.52		107.81	0.615	0.0047		
Portlaoise WS	8/21/1996	1996				nda	nda	17.52		9.22	1.58	11.17		121.7	0.070	<0.0005		
Portlaoise WS	11/20/1996	1996				nda	nda	20.58		8.4	2.27	6.9		119	0.093	0.0309		
Portlaoise WS	10/30/1997	1997				nda	nda	16.98		10.205	1.71	10.16		129.255		0.001		
Portlaoise WS	2/11/1998	1997				nda	nda	16.6		9.6	2.6	10.4		125.7	0.032	0.0096		
Swan Ntwn Doonane	8/22/1996	1996				nda	nda	36.09		21.48	3.29	25.33		43.74	0.400	0.1403		
Swan Ntwn Doonane	11/21/1996	1996				nda	nda	32.9		24.12	3.96	25.7		48.27	0.189	0.159		
Swan Ntwn Doonane	11/3/1997	1997				nda	nda	25.68		22.33	2.455	25.3		47.045	0.207	0.15		
Swan Ntwn Doonane	2/12/1998	1997				nda	nda	32.1		25.5	3.9	27		47.4	0.216	0.141		
Donoghmore	12/5/1995	1995				nda	nda	25.35		9.51	1.52	28.17		83.12	0.732	0.0017		
Donoghmore	8/21/1996	1996				nda	nda	16.81		9.22	1.74	24.92		111.8	0.099	<0.0005		
Donoghmore	11/20/1996	1996				nda	nda	25.52		9.89	1.7	21.88		111.5	0.542	0.0325		
Donoghmore	10/30/1997	1997				nda	nda	27.04		18.455	5.205	28.755		99.34	0.011	0.0006		
Donoghmore	2/11/1998	1997				nda	nda	23.9		9.5	1.6	28.1		95.4	0.076	<0.0005		
Fermoyle	8/21/1996	1996				nda	nda	23.15		10.44	2.71	20.14		135.8	0.124	<0.0005		
Fermoyle	11/20/1996	1996				nda	nda	32.33		10.23	10.38	15.07		135.6	0.145	0.0007		
Fermoyle	10/30/1997	1997				nda	nda	31.515		10.1	1.45	19.13		135.345	0.016	0.0008		
Fermoyle	2/11/1998	1997				nda	nda	26.7		11.5	3.8	18.7		128.8	0.013	<0.0005		
Knocks	8/21/1996	1996				nda	nda	7.34		7.83	3.68	2.72		68	0.089	<0.0005		
Knocks	11/20/1996	1996				nda	nda	6.83		6.63	1.41	1.1		65.27	0.008	0.0005		
Knocks	10/30/1997	1997				nda	nda	10.22		14.605	4.76	3.495		59.58	0.014	0.0008		
Knocks	2/11/1998	1997				nda	nda	7.5		7.9	1.4	3.3		66.3		<0.0005		

Appendix E: EPA Sampling and Analytical Data. Selected Groundwater Supply Sources in County Laois

LOCATION	DATE	YEAR	CHROMIUM(M	LEAD (MG/L	BARIUM (MG	CADMIUM(MG	NICKEL(MG/	ANTIMONY(M	S CODE
Abbeyleix	12/5/1995	1995							nmp
Abbeyleix	8/21/1996	1996							nmp
Abbeyleix	11/20/1996	1996							nmp
Abbeyleix	10/30/1997	1997							nmp
Abbeyleix	2/11/1998	1997							nmp
Abbeyleix	12/5/1995	1995							nmp
Abbeyleix	8/21/1996	1996							nmp
Abbeyleix	11/20/1996	1996							nmp
Abbeyleix	10/30/1997	1997							nmp
Abbeyleix	2/11/1998	1997							nmp
Abbeyleix	12/5/1995	1995							nmp
Abbeyleix	8/21/1996	1996							nmp
Abbeyleix	11/20/1996	1996							nmp
Abbeyleix	10/30/1997	1997							nmp
Abbeyleix	2/11/1998	1997							nmp
Athy Town WS	8/22/1996	1996							nmp
Athy Town WS	11/21/1996	1996							nmp
Athy Town WS	11/3/1997	1997							nmp
Athy Town WS	2/12/1998	1997							nmp
Coolenaugh	8/22/1996	1996							nmp
Coolenaugh	11/21/1996	1996							nmp
Coolenaugh	11/3/1997	1997							nmp
Coolenaugh	2/12/1998	1997							nmp
Portlaoise WS	12/5/1995	1995							nmp
Portlaoise WS	8/21/1996	1996							nmp
Portlaoise WS	11/20/1996	1996							nmp
Portlaoise WS	10/30/1997	1997							nmp
Portlaoise WS	2/11/1998	1997							nmp
Swan Ntwn Doonane	8/22/1996	1996							nmp
Swan Ntwn Doonane	11/21/1996	1996							nmp
Swan Ntwn Doonane	11/3/1997	1997							nmp
Swan Ntwn Doonane	2/12/1998	1997							nmp
Donoghmore	12/5/1995	1995							nmp
Donoghmore	8/21/1996	1996							nmp
Donoghmore	11/20/1996	1996							nmp
Donoghmore	10/30/1997	1997							nmp
Donoghmore	2/11/1998	1997							nmp
Fermoyle	8/21/1996	1996							nmp
Fermoyle	11/20/1996	1996							nmp
Fermoyle	10/30/1997	1997							nmp
Fermoyle	2/11/1998	1997							nmp
Knocks	8/21/1996	1996							nmp
Knocks	11/20/1996	1996							nmp
Knocks	10/30/1997	1997							nmp
Knocks	2/11/1998	1997							nmp

APPENDIX F

Appendix F: Data Taken 'Nitrates in Groundwater County Laois' (EPA, 1997).

EPA Well No	GSI Name	Date Sampling	Body	Nitrate in mg/l (as NO3)
1	Five Wells, Abbeyleix	5-Dec-95	EPA Compilation	27.365
2	Aughfeerish	5-Dec-95	EPA Compilation	23.867
3	Max Well	5-Dec-95	EPA Compilation	30.907
9	Tullore, Ballyroan	4-Dec-95	EPA Compilation	28.3
10	Townspark, Borris-in-Ossory	24-Jul-95	EPA Compilation	8.1
14	Durrow Convent	10-Apr-95	EPA Compilation	30.4
14	Durrow Convent	23-Oct-95	EPA Compilation	24.4
14	Durrow Convent	23-Oct-95	EPA Compilation	33.9
16	Emo	19-Jun-95	EPA Compilation	30.6
16	Emo	4-Dec-95	EPA Compilation	43.5
19	Derryguile	6-Feb-95	EPA Compilation	2.7
19	Derryguile	19-Jun-95	EPA Compilation	1.7
23	Darkin Well/Straboe	23-Jan-95	EPA Compilation	0.3
23	Darkin Well/Straboe	6-Feb-95	EPA Compilation	0.2
23	Darkin Well/Straboe	6-Feb-95	EPA Compilation	23.3
23	Darkin Well/Straboe	6-Feb-95	EPA Compilation	26.2
23	Darkin Well/Straboe	20-Feb-95	EPA Compilation	20.5
23	Darkin Well/Straboe	21-Aug-95	EPA Compilation	11.3
23	Darkin Well/Straboe	21-Aug-95	EPA Compilation	15.9
23	Darkin Well/Straboe	21-Aug-95	EPA Compilation	16.7
23	Darkin Well/Straboe	5-Dec-95	EPA Compilation	20.015
26	Rosenallis	22-May-95	EPA Compilation	12.5
26	Rosenallis	27-Nov-95	EPA Compilation	<0.1
26	Rosenallis	27-Nov-95	EPA Compilation	10.5
28	The Swan	22-May-95	EPA Compilation	<0.1
28	The Swan	27-Nov-95	EPA Compilation	<0.1
29	The Orchard, Timahoe	10-Apr-95	EPA Compilation	14
29	The Orchard, Timahoe	18-Sep-95	EPA Compilation	9.4
37	Donaghmore GWS.	5-Dec-95	EPA Compilation	3.542
39	Fermoyle, Durrow	10-Apr-95	EPA Compilation	23.2
39	Fermoyle, Durrow	23-Oct-95	EPA Compilation	28.6