EPA DRINKING WATER ADVICE NOTE

Advice Note No. 13:

Pesticides in Drinking Water

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1 INTRODUCTION

The purpose of this Advice Note is to provide guidance to Water Services Authorities (WSAs) where pesticides have been detected in drinking water and on the actions that should be taken in such an event. Surface water and groundwater may contain traces of pesticides. However, the number of drinking water supplies with exceedances has been low. The Environmental Protection Agency (EPA) aims minimise the potential for entry of pesticides into water at source, through catchment protection, rather than having to remove them via treatment processes at the water treatment plant.

Pesticides is a broad term, encompassing plant protection products (e.g. weedkillers), biocidal products and certain veterinary medicine products. Plant protection products are pesticide products used to protect crops and plants from harm caused by diseases, insect pests and weeds and other harmful organisms. Biocidal products are pesticide products that are not used in agricultural production. They cover a diverse range of uses and are used widely in the food industry to disinfect surfaces and machinery and to preserve materials. Pesticides include; organic insecticides, herbicides, fungicides, nematocides, algicides, rodenticides, slimicides, related products and their relevant metabolites, degradation and reaction products.

The ***European Communities (Drinking Water) (No. 2) Regulations 2007 (S.I 278 of 2007)*** is the legislation that sets out the parametric values for pesticides. These limits are put in place for the protection of human health having regard to the precautionary principle. The regulations set out the following parametric values for pesticides:

Pesticides (individual)	0.10	µg/l
Aldrin, dieldrin, heptachlor and heptachlor epoxide[1]	0.030	µg /l
Pesticides - Total	0.50	µg/l

The "Pesticides" parametric value of 0.10 µg/l applies to each individual pesticide. The parametric value of 0.030 µg/l applies to each of the 4 individual pesticides listed.

"Pesticides – Total" means the sum of all individual pesticides detected and quantified in the course of the monitoring procedure. Any pesticide included in the compliance monitoring programme that was not detected (that is its concentration was less than the limit of detection of the method used) is assumed, for the purposes of this calculation, not to be present and to make no contribution to the total pesticides concentration.

Depending on concentration, dose, the individual pesticide and its toxicity, long term exposure to pesticides can increase the risk of developmental and reproductive disorders, endocrine disruption, immune-system disruption, development of certain cancers and impaired nervous system function. Acute exposure to pesticides can result in serious illness or death on very rare occasions.

The EPA report ***"The Provision and Quality of Drinking Water in Ireland - A report for the year 2011"*** summarises that, while the issue of pesticides in drinking water has not presented a risk to human health to date, occasional exceedances of the pesticides parametric value of 0.10 µg/l have occurred in a limited number of supplies. Exceedances were notified to the EPA in respect of 10 supplies in 2011. None of the exceedances of the 0.10 µg/l parametric value reported to the EPA to date have exceeded the World Health Organisation (WHO) Guideline Values for the individual pesticides concerned.

1 The use of aldrin, dieldrin, heptachlor and heptachlor epoxide has been banned in Ireland since 1981.

2 SOURCES OF PESTICIDES IN IRELAND

Pesticides encompass plant protection products (PPPs), biocidal products (BPs) and certain veterinary medicine products (VMPs). The Pesticide Registration and Control Division (PRCD) of the Department of Agriculture, Food and the Marine (DAFM) is the designated competent authority with responsibility for implementing the regulatory system for PPPs and BPs. Details of authorised pesticides are available in the pesticides section of the Department's website *(www.pcs.agriculture.gov.ie).* Annual and quarterly reports are also published. VMPs (which include sheep dip) are regulated by the Irish Medicines Board.

Pesticides are used across a variety of sectors in Ireland including forestry, agriculture, horticulture, transportation (e.g. railways and roadside verges), amenity (such as golf courses, sports parks and public parks) and industry as well as by domestic users in the home and garden. The agricultural and forestry sectors most likely account for the greatest quantity of pesticides used nationally. In agriculture, which occupies 64% of the land area of the state, pesticides are used primarily for pest control in animal husbandry, grassland management and in arable farming such as in cereal and fodder crop production. In the forestry sector, which occupies approximately 9% of the country's land area, pesticides are used for the control of weeds and insects such as the pine weevil.

Appendix 1 lists pesticides that are known to be in common use in Ireland or are monitored by some WSAs. Some of these substances monitored have now been banned. The most up to date list of approved pesticides is available at **www.pcs.agriculture.gov.ie.**

3 SOURCE PROTECTION

The *European Communities (Sustainable Use) of Pesticides Regulations, 2012 (SI No. 155 of 2012)* among other things prohibits the use of pesticides near drinking water abstraction zones which range in size from 5 m to 200 m depending on the type of abstraction point or borehole. Regulation 11 of SI 155 of 2012 states that:

1. **A person shall not use a pesticide within the distance set out in Schedule 2 opposite the water source described in the Schedule.**
2. **A person shall not use a pesticide within 15 m of a landscape feature that is known to be a ground water vulnerable area including karst areas, sinkholes and collapse features.**
3. **Subject to paragraph (1) and (2), a person shall not use a pesticide close to water other than in accordance with the conditions set out in the approved label for that pesticide.**

Water Source	Distance
Abstraction point of any surface waters, borehole, spring or well used for the abstraction of water for human consumption in a water scheme supplying 100 m^3 or more of water per day or serving 500 or more persons	200 m
Abstraction point of any surface waters, borehole, spring or well used for the abstraction of water for human consumption in a water scheme supplying 10 m^3 or more of water per day or serving 50 – 500 persons	100 m
Abstraction point of any surface waters, borehole, spring or well used for the abstraction of water for human consumption in a water scheme supplying 1-10 m^3 of water per day or serving 10-50 persons	25 m
Abstraction point of any surface waters, borehole, spring or well used for the abstraction of water for human consumption in a water scheme supplying 1m^3 or less of water per day or serving 10 or less persons	5 m

These Regulations also set out a number of other requirements which will indirectly affect source protection and should lead to improved practices with regards to pesticide usage including compulsory training for sprayers, inspection of spraying equipment and the establishment of an official register of certified professional users of pesticides, distributors, advisors and inspectors of pesticide application equipment. A person found guilty of an offence resulting in or leading to water pollution is liable for removal from the register by the authorised body the Department of Agriculture, Food and the Marine.

PESTICIDE USE AT USE TREATMENT PLANTS

The EPA advises that notwithstanding the above legal requirements plant protection product pesticides should not be stored or used by water suppliers within water treatment plants for any purpose. There are multiple potential entry points for pesticides to enter the raw, process or treated water at a treatment works (e.g. spray drift, vents, manhole covers etc) and therefore plant protection product pesticides should not be used at any location within the boundary of a water treatment works or associated works (pumping stations and reservoirs). Particular attention should be paid to the use of rodenticides at water treatment plants. Rats consuming rodenticides are likely to seek a source of water following ingestion and there is a risk of the poisoned rat entering the water at the plant. The use of rodenticides should be avoided unless absolutely necessary and where they are used, it should be for a limited duration until the problem is brought under adequate control. If a rodent control programme is being considered at a water treatment facility the WSA should ensure that:

- A site assessment is carried out to assess if rodent control is necessary, and, if so, the potential sources of infestation and the possibility for non-chemical control methods (taking in to account the type, level and extent of the infestation). A professional pest control operator may be needed to undertake this survey.
- If rodenticide use is deemed necessary, document why this is so and engage a professional pest control operator (specifically trained in the safe use of rodenticides).
- The placing of baiting points is very carefully considered, so as to ensure an adequate level of control, while minimising the potential for water contamination. The pest control operator should work in conjunction with the WSA to identify suitable baiting sites offering the maximum protection from a drinking water point of view. Make a map of the bait points.
- Bait is placed in secure baiting stations under cover, taking care to avoid spillages. The amount of bait placed in each station should be recorded.
- Baiting points are regularly checked to see if bait has been taken and replenish if necessary.
- Any dead rats are removed (check regularly during and after treatment period). Also remove any bait that has been moved outside the baiting station.
- The baiting campaign only lasts as long as is necessary to deal with the infestation and unused bait should be removed afterwards. Avoid the use of permanent baits.
- Rodenticides are not to be stored on or adjacent to the water treatment facility.

Access to untreated and treated water within the water treatment plant must be made secure from vermin and should be regularly checked if rodenticide is to be used. Alternative, non-pesticide, means of vermin control should be investigated and used wherever possible.

4 HOW PESTICIDES CAN ENTER DRINKING WATER SUPPLIES

Pesticides can enter surface or ground water bodies used as sources for drinking water supplies through direct application, run-off, spray drift, volatilisation or by seeping through the soil. They may also enter as source point inputs from pesticide handling areas from mixing, filling, washing, spillage and leakage. Pesticides and their metabolites can enter source waters in solution, emulsion or bound to soil particles and can originate from the area of use (e.g. lands used for agriculture, forestry, horticulture or golf courses, residential gardens, parks and sports pitches etc.) or from areas of improper storage or disposal of pesticides or pesticide containers. Use of pesticides on hard surfaces (e.g. roadside verges) can be a vulnerable pathway for entry into surface waters. Some pesticides are resistant to degradation and may persist and accumulate in aquatic ecosystems. Information on individual pesticides is available from the Pesticides Registration and Control Division of DAFM *(http://www.pcs.agriculture.gov.ie/)*.

Conventional treatment in place in drinking water treatment plants in Ireland (coagulation, rapid gravity filtration, slow sand filtration and disinfection) do not remove pesticides and therefore any pesticides present in raw water sources are likely to pass through the treatment plant and into the distribution network.

5 MONITORING OF PESTICIDES BY WSAS

The EPA has produced extensive guidance on monitoring for pesticides, which is a legal requirement of the *European Communities (Drinking Water) Regulations (No.2), 2007.* This guidance is available in the EPA Handbook entitled *European Communities (Drinking Water) Regulations (No.2), 2007: A Handbook on the Implementation of the Regulations for Water Services Authorities for Public Water Supplies (http://www.epa.ie/pubs/advice/drinkingwater/publicwatersupplieshandbook/).* All WSAs should develop and implement a monitoring programme in accordance with these guidelines which incorporate the risk based approach to the identification and monitoring of pesticides.

6 ACTIONS IN THE EVENT OF A PESTICIDE EXCEEDENCE

This section outlines the steps that should be taken by a WSA following the failure to meet the individual pesticide parametric values of 0.10 µg/l for pesticides, or 0.03 µg/l (for aldrin, dieldrin, heptachlor and heptachlor epoxide) or 0.50 µg/l for Total Pesticides as specified in Table B of Part 1 of the Schedule of the *European Communities (Drinking Water) Regulations (No.2), 2007 (S.I. 278 of 2007).*

Following the detection of pesticide levels above the parametric value:

1. The **WSA must consult with the Health Service Executive** to determine if there is a risk to public health. Risk assessments include establishing the source-receptor pathway and extent of the potential population exposed by considering:
   - **a.** The extent of the consumer population exposed and its age structure.
   - **b.** The duration of the exposure i.e. when was the last compliant sample so that the cumulative risk could be quantified.
   - **c.** The type of water supply – if surface water it will be very different from groundwater as the exposure is likely to be of shorter duration.

   This information should inform the remedial measures to be put in place by the WSA and the need to communicate the risk to the population along with the enhanced monitoring programme.

   This consultation will generally have regard to the World Health Organisation Guidelines for Drinking Water Quality, which is available to download at *http://www.who.int/water_sanitation_health/dwq/guidelines/en/*. It is also recommended that the WSA consult with the Pesticide Registration and Control Division (PRCD) of the Department of Agriculture, Food and the Marine (DAFM) as they have specialist toxicologists who are able to provide detailed information and advice and are able to quantify the degree of risk.

2. The **WSA must notify the EPA** of the pesticide non-compliance in accordance with Section 6 of the EPA Handbook on the Implementation of the Regulations for Water Service Authorities for Public Water Supplies using the Online Drinking Water Notification System (*http://web.epa.ie/odwn/login.aspx*). In notifying the EPA, the WSA should refer to any previous pesticide non-compliances in this supply. If the advice of the HSE is pending, the EPA should still be notified of the non-compliance and this notification followed up with additional information as soon as HSE advice has been received. The notification should include the individual pesticide(s) that have exceeded the parametric value(s).
3. **Where the WSA, in consultation with the HSE consider the supply constitutes a potential danger to human health** the WSA should consider the need to temporarily suspend the water supply/consider the feasibility of temporary treatment (e.g. dosing with Powdered Activated Carbon). The WSA should also ensure that resources are immediately mobilised to investigate the type of pesticide, the potential usage of the pesticide and known high risk areas for its use. It may be necessary to carry out catchment inspections to identify the source of the pesticides. Measures to reduce pesticide concentrations in the raw water should be taken, where practicable, including enforcement of the Pesticides Regs in conjunction with DAFM and education of pesticides users. It is also recommended that the WSA consult with the Pesticide Registration and Control Division (PRCD) of the Department of Agriculture, Food and the Marine (DAFM) with regard to the usage of pesticides in the catchment. These measures should be set out in the form of a catchment action programme with timeframes and should be communicated to the EPA. Consultation with and engagement

of stakeholders involved in activities using pesticides is critical in the development of a catchment action plan. The communication should also outline responsibilities for actions and access to relevant information (e.g. registers).

4. **Where the HSE has advised that there is no potential danger to human health posed by the breach the** WSA should investigate, or arrange to have investigated, the source of the pesticide, consult and engage with stakeholders involved in activities using pesticides, carry out additional monitoring and implement catchment and/or treatment measures to reduce the incidence of non-compliance. The investigation and corrective action should follow the steps outlined below. The WSA should consult with the PRCD to check if there are any statutory implications or regulatory conflicts particularly with regards to catchment measures. Any enforcement actions should be agreed between the PRCD and the WSAs and a communication protocol to facilitate the provision of information and advice that established the roles of the PRCD, WSA and HSE should be developed.

INVESTIGATIONS/CORRECTIVE ACTIONS

An investigation into the cause of the non-compliance should be carried out using the steps outlined below. Where a Water Safety Plan has been prepared for the supply much of this information should already be available and should be reviewed as part of the investigation.

Step 1: Define the catchment area or zone of contribution

The delineation of the catchment area or zone of contribution pertaining to the abstraction point should be undertaken to define the area that may be contributing to the pesticide non-compliance. For lake and river abstraction points, EPA hydrometric area datasets are available to download from *http://gis.epa.ie.* For groundwater sources, zones of contribution may be available from the EPA at *http://www.epa.ie/whatwedo/monitoring/water/groundwater/gwmp/* or from the Geological Survey of Ireland at *http://gis.epa.ie/Default.aspx*. The steps that follow should be targeted in the zone of contribution or the catchment of the surface water source starting in areas that are either closest to the abstraction point or most likely to influence water quality (e.g. karst features). However, it is important to consider that if the source of the pesticides is volatilisation or spray drift, the source may be outside the catchment area or zone of contribution.

Step 2: Identify potential diffuse and point pesticide sources

Diffuse Sources: When diffuse and point sources have been identified, specific information should be gathered on pesticides in use within the catchment. The European Communities Authorization, Placing on the Market, Use and Control of Plant Protection Products) (Amendment) (No. 4) Regulations, 2006 (S.I. No. 381 of 2006 requires that all end users of plant protection products for professional use maintain records of acquisition, use and disposal. Farmers, horticultural producers, amenity workers, foresters etc. are legally obliged to retain pesticide application logs for all treated crops and areas. As part of the survey, managers of private amenity areas such as golf courses should be asked to provide information to the WSA on the pesticides in use and their application practices. The WSA should seek the assistance of DAFM in accessing these records and record holders are legally required to provide these records to authorised officers of DAFM. Public amenity areas are likely to be under the management of the WSA itself; the relevant department should be consulted regarding pesticide use and application. It is also recommended to liaise with the main retailers of pesticides in the area to determine what pesticides have been sold and which are most likely to have been applied in the catchment. The following activity types, which are potential diffuse sources of the plant protection product pesticides, may be used in the breakdown of catchment landuses of significance:

- Agriculture
- Amenity (golf clubs, sports pitches, hotels etc)
- Horticulture
- Forestry
- Transport (railways and roadside verges)
- Urban areas

The potential for pesticide use in each of the landuse areas should be assessed and used to target catchment inspections. It should be noted that the type of pesticide found may be associated with particular land uses at particular times of the year.

There is a much greater range of activities for the biocidal products, which need to be assessed on a case by case basis.

Point Sources: The WSA should compile an inventory of industries, storage depots, farm yards, sheep-dip sites etc. in the catchment. IPPC or Waste Licensed industries can be identified using the EPA's web-based GIS system while information on sheep dip can be obtained from the Irish Medicines Board (*www.imb.ie*). Non-EPA licensed industries and sites of relevance can be identified through local intelligence and the knowledge of the WSA staff involved in the day to day operation of the water treatment plant. Information held by the WSA's environment section derived from the farm inspections should be utilised for this exercise. The WSA should also consult with Teagasc (e.g. REPS and AEOS advisors), Forest Service Officials and the Department of Agriculture, Food and the Marine regarding details of farm inspections in the catchment and should develop a protocol for accessing this information.

When diffuse and point sources have been identified, specific information should be gathered on pesticides in use within the catchment. In accordance with advice provided by the Department of Agriculture Forestry and Food's Pesticide Registration and Control Service, farmers should have Pesticide Application Logs available for any pesticides used as already required under SMR 9 of cross compliance requirements *(European Communities (Plant Protection Products) Regulations 2012 (SI No. 159 of 2012))*. Horticultural producers are legally required to comply with Pesticide Regulations and record the application/usage of pesticides. WSAs should liaise with the PRCD regarding access to these records. Regarding areas of forestry, Coillte or private forestry owners should be contacted and information sought on the pesticides used and the application regime being followed. As part of the survey, managers of private amenity areas such as golf courses should be asked to provide information to the WSA on the pesticides in use and their application practices. Public amenity areas are likely to be under the management of the WSA itself; the relevant department should be consulted regarding pesticide use and application. It is also recommended to liaise with the main retailers of pesticides in the area to determine what pesticides have been sold and which are most likely to have been applied in the catchment.

Step 3: Baseline monitoring

An assessment of existing raw and treated water monitoring should be carried out by reviewing available data sources prior to the implementation of any investigative monitoring.

Raw water data: Raw water monitoring at the drinking water treatment plant intake should be examined, in the first instance, to determine if analysis has been undertaken for pesticides and whether any pesticides have been recorded above the limits of detection. Any further available baseline monitoring data should be collated and examined. Data generated by the Office of Environmental Assessment of the EPA within both the National Groundwater Monitoring Network and the Water Framework Directive Surveillance monitoring programme should be examined for any pesticide detections. The EPA queries unit (*queriesunit@epa.ie*) should be contacted in order to access these datasets.

Raw water baseline monitoring: Following examination of any existing data available, further baseline monitoring may be considered necessary to determine the background pesticide levels occurring in surface and groundwater in the catchment. A raw water baseline monitoring programme should have regard to the findings of steps 1 and 2 (above). WSAs must ensure that the full suite of pesticides deemed likely to occur at concentrations approaching or exceeding the standard is being monitored. It is recommended that monitoring takes place at a frequency of monthly or weekly to determine if the original non-compliance was a one-off occurrence. This monitoring should comprise of at least 6 samples per annum during the appropriate period of usage of the pesticide concerned which should be determined using information on the PRCD website and in consultation with the PRCD. The WSA should inform the EPA of the intended additional monitoring and indicate an estimated date on which results will be submitted. Where the treatment plant does not have a pesticide removal stage present it may be more convenient and equally informative to sample from the treated water. Any non-compliance of the parametric values deemed to present no danger to human health should be acted upon through the implementation of control measures to reduce levels occurring in the catchment as outlined in Point 4 of Section 6 above.

Catchment baseline monitoring: Further baseline sampling in the catchment may be required to identify diffuse and point sources contributing to pesticide detections. Sampling locations should be selected to target river locations upstream and downstream of confluences, upstream and downstream of potential pesticide sources, etc. Further sampling of sub-catchments may be required if initial sampling results are inconclusive in terms of pesticide sources. Spatially targeted monitoring will, in turn, assist in targeting any pesticide control measures determined to be necessary. The frequency of monitoring should be the same as that outlined above for raw water baseline monitoring.

WSA should take account of the recommended and usual pesticide application periods when assessing pesticide monitoring data and when selecting monitoring frequencies for monitoring.

Step 4: Risk Assessment

The above information should be used to assess risk and identify sources that may cause and are already causing pesticides to enter surface and/or groundwaters at concentrations approaching or exceeding the parametric value. The purpose of the risk assessment is to guide the prioritisation of control measures.

Where it is suspected that there are activities in the catchment or zone of contribution which are contributing to pesticide detections recorded during the baseline monitoring programme, a targeted catchment inspection should be carried out and the relevant stakeholders should be informed of the findings (e.g. Teagasc, REPS advisors, Pesticide Registration and Control Division, EPA). Additional sampling may be considered in order to verify the potential for pesticide inputs to occur. Communication Protocols should include arrangements for exchange of information between WSAs and the PRCD.

Step 5: Control measures

Information obtained through desk studies, monitoring and catchment inspections within the catchment will inform the decision on the extent of measures required to manage the identified risks. Catchment inspections carried out for other purposes (e.g. cross compliance inspections) should also be considered as an assistance in the pesticide investigation and its control of use. Some catchment protection measures may already be in place whilst other may need to be put in place.

Following each inspection undertaken in the catchment, a site inspection report should be prepared and the associated recommendations should be issued to the site or land owner/manager for implementation. Such recommendations should also be sent to any other stakeholders, if appropriate, for their information (e.g. Inland Fisheries Board, EPA, Teagasc, PRCD, etc).

Information for pesticide users on the environmental and public health risks associated with pesticides and best practice for use of pesticides regarding the storage, use and disposal of pesticide products should be prepared. Resources such as the Pesticide Registration and Control Division's *Principles of Good Plant Protection Practice* and *Pesticides 2011* (DAFM, 2011) should be referenced in the preparation of advice for third parties. Other WSAs may have prepared literature which may be useful to review also. (Donegal County Council has prepared *Guidance on the safe use of Pesticides to Protect the Aquatic Environment, Advice on safe handling of Pesticides to Protect the Aquatic Environment* and *Advice on the Safe Disposal of Spent Sheep Dip.* See Appendix 2.) The EPA and the Department of Agriculture, Food and the Marine has also prepared a good practice guide for empty pesticide containers *http://www.pcs.agriculture.gov.ie/Docs/Good_Practice_Guide_for_empty_pesticide_containers.pdf*. Priority should be given to the provision of advice to parties/managers of activities which are the suspected sources of detected elevated pesticide levels and where either inspections have raised concerns regarding pesticide management practices or monitoring has pointed to pesticide contributions to surface waters or groundwaters. WSAs should utilise local farming groups, retailers and suppliers of pesticides to assist in the dissemination of advice on their use.

A catchment-based programme of control measures should be implemented on a prioritised basis, depending on the likelihood of pesticide inputs or measured impact. Where recommendations for control measures, having been agreed with PRCD, are issued to third parties, time periods should be specified for the implementation of such recommendations. These measures should link with the programme of measures under the River Basin Management Plans, where appropriate.

The *European Communities (Sustainable Use) of Pesticides Regulations, 2012 (SI No. 155 of 2012)* has introduced specific measures restricting the use of pesticides near drinking water abstraction points (see Section 3), in the form of safeguard zones that range from 5 m to 200 m depending on the type of abstraction. WSA's should notify farmers of the location of lands in the vicinity of public water abstractions where application of pesticides is prohibited under these Regulations.

Step 6: Verification of control measure effectiveness

Follow-up inspections should be scheduled for the end of the period as specified in the recommendations issued to verify the implementation of such measures. Where catchment protection measures are implemented, a monitoring programme should follow to determine whether the measures have led to reduced pesticide levels in surface waters and/or groundwaters. Catchment characteristics should be taken into account when scheduling follow-up monitoring, acknowledging that not all measures will lead to immediate ameliorative effects.

In cases where the recommended measures were put in place and found to be inadequate or the time taken for measures to be implemented or to take effect is considered unacceptable, appropriate treatment of water will need to be installed to remove or break down the pesticide occurring at concentrations above the standard. Installation of treatment to remove or break down a pesticide should only be considered when all appropriate catchment control measures have been implemented unless there is a potential danger to human health.

The most commonly used treatment for the removal of or destruction of pesticides include Powder Activated Carbon (PAC), Granular Activated Carbon (GAC) and ozone sometimes in combination with each other. Where treatment is required, the selection of treatment type shall have regard to the existing treatment at the plant and the ability of the plant to incorporate the additional treatment phase into the existing treatment system.

7 EPA ROLE IN DEALING WITH PESTICIDES IN DRINKING WATER

Where monitoring results indicate elevated levels of pesticides in drinking water (i.e. exceeding 0.10 µg/l), Water Services Authorities must investigate the source of the pesticide(s) and must prepare an action programme to ensure the drinking water complies with the 0.1 µg/l parametric value for individual pesticides and 0.50 µg/l for total pesticides. Where the WSA is not proactively implementing measures to investigate the cause of the pesticides or not implementing measures to rectify the problem, the EPA may issue a legally binding direction. Failure to comply with a direction is an offence.

8 FURTHER INFORMATION

1. Department of Agriculture and Rural Development Northern Ireland (2011). *Pesticides: Code of Practice for using Plant Protection Products.*
2. Department of Agriculture, Food and the Marine (2007) *Principles of Good Plant protection practice.* Pesticide Registration and Control Division. *(http://www.pcs.agriculture.gov.ie/Docs/Good%20Plant%20Protection%20Pratice%20March%202007.pdf)*
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16. World Health Organisation (2011). *Guidelines for Drinking water Quality. Fourth Edition. (http://www.who.int/water_sanitation_health/publications/2011/dwq_guidelines/en/)*
17. World Health Organisation (2009) *The WHO Recommended Classification of Pesticides by Hazard and Guidelines to Classification 2009. (http://www.who.int/ipcs/publications/pesticides_hazard_2009.pdf)*

APPENDIX 1. PESTICIDES IN COMMON USE IN IRELAND OR MONITORED FOR BY SOME WSAS

Pesticides in common use in Ireland

Substance Name[2]	Use/Function	Guideline Value (GV) / Provisional Guideline Value (PGV)
Chlorothalonil	Fungicide.	No WHO Guideline Value.
Bentazon	Contact herbicide.	No WHO Guideline Value.
Bromoxynil	Herbicide.	No WHO Guideline Value.
Chlorpropham	Herbicide and plant regulator.	No WHO Guideline Value.
Chlorotoluron	Herbicide.	0.03 mgl/l (30 µg/l) (GV)
Clopyralid	Herbicide.	No WHO Guideline Value.
Cypermethrin	Insecticide.	No WHO Guideline Value.
Deltamethrin	Insecticide.	No WHO Guideline Value.
Demeton-s-methyl	Acaricide and Insecticide	No WHO Guideline Value.
Diuron	Herbicide.	No WHO Guideline Value.
Epoxiconazole	Fungicide.	No WHO Guideline Value.
Fenvalerate	Insecticide	No WHO Guideline Value.
Glyphosate	Broad spectrum herbicide used in both agriculture and forestry and for aquatic weed control.	No WHO Guideline Value.
Isoproturon	Selective, systematic herbicide used in the control of annual grasses and broad leaved weeds in cereals.	0.009 mg/l (9 µg/l) (PGV)
MCPA or 4-(2methyl-4-chlorophenoxy)acetic acid	Post emergence herbicide.	0.002 mg/l (2 µg/l) (GV)
Mecoprop	Herbicide.	0.01 mg/l (10 µg/l) (GV)
Metaldehyde	Molluscicide used against slugs, snails and other gastropods. Usually in the form of pellets for ingestion.	No WHO Guideline Value.
Pendinethalin	Herbicide.	0.02 mg/l (20 µg/l) (GV)
Propyzamide	Herbicide.	No WHO Guideline Value.
Terbuthylazine (TBA)	Herbicide used for pre-emergence and post-emergence treatment of a variety of crops in agriculture and forestry.	0.007 mg/l (7 µg/l) (GV)
Triazines	Herbicides used for weed control.	No WHO Guideline Value.
Triclopyr	Herbicide.	No WHO Guideline Value.
2,4-D (2, 4-dichlorophenoxyacetic acid)	Systematic herbicide used for the control of broad-leaved weeds, including aquatic plants.	0.03mg/l (30µg/l) (GV)
2,4-DB	Herbicide.	0.09 mg/l (90 µg/l) (GV)

2 Full list of commercial product names available at: *http://www.pcs.agriculture.gov.ie/getactive.asp*

Substances which are no longer legally available in plant protection products and for which some WSA's may be monitoring

Name	Use/Function	Guideline Value (GV) / Provisional Guideline Value (PGV)
Aldrin	Used against soil dwelling pests and for wood protection.	*Aldrin and Dieldrin (combined)* 0.00003 mg/l (0.03 µg) (GV)
Atrazine	Selective herbicide for the control of annual broadleaf and grassy weeds.	0.1 mg/l (100 µg/l) (GV)
Bromacil	Herbicide. Also used as a rodenticide.	No WHO Guideline Value.
o,p-DDE	Insecticide.	0.001 mg/l 1 µg/l) (GV)
o,p-DDT	Insecticide.	0.001 mg/l 1 µg/l) (GV)
o,p-DDE (TDE)	Insecticide.	0.001 mg/l 1 µg/l) (GV)
p,p-DDT	Insecticide.	0.001 mg/l 1 µg/l) (GV)
p,p-DDD(TDE)	Insecticide.	0.001 mg/l 1 µg/l) (GV)
DDt and related metabolites	Insecticide.	0.001 mg/l 1 µg/l) (GV)
Diazinon	Insecticide.	No WHO Guideline Value.
Dieldrin	Insecticide.	No WHO Guideline Value.
Desethylatrazine	Herbicide.	No WHO Guideline Value.
Dichlobenil	Herbicide.	No WHO Guideline Value.
EndosulfanA (alpha-endosulfan)	Insecticide to control pests on fruit and vegetable crops. Used internationally on crops such as tobacco, tea and cotton.	No WHO Guideline Value.
EndosulfanB (alpha-endosulfan)	Insecticide.	No WHO Guideline Value.
Endrin	Broad spectrum foliar insecticide that acts against a wide range of agricultural pests. Also used as a rodenticide.	0.0006 mg/l (0.6 µg/l) (GV)
gamma-BHC / HCH (Lindane)	Agricultural insecticide and a pharmaceutical treatment for lice and scabies.	No WHO Guideline Value.
Hexachlorobenzene	Was used as a seed dressing for crops for preventing the growth of fungi. It now appears mainly as a by-product of chemical processes or as an impurity in some pesticides.	No WHO Guideline Value.
Heptachlor	Broad spectrum insecticide. Banned in many countries.	No WHO Guideline Value.
Heptachlor Epoxide	Heptachlor is transformed into Heptachlor epoxide when it enters soil.	No WHO Guideline Value.
Hexachlorobutadiene (HCBD)	Herbicide	0.0006 mg/l (0.6 µg/l) (GV)
alpha HCH	By-product of the production of the insecticide lindane.	No WHO Guideline Value.
Beta-HCH	Insecticide.	No WHO Guideline Value.
Delta-HCH	Insecticide.	No WHO Guideline Value.
Isodrin	Insecticide.	No WHO Guideline Value.
Malathion	Controls a variety of insects that attack fruit, vegetables etc, and on animals and humans to control lice.	No WHO Guideline Value.

Name	Use/Function	Guideline Value (GV) / Provisional Guideline Value (PGV)
Methoxychlor	Insecticide used on vegetables, fruits trees fodder and farm animals.	0.02 mg/l (20 µg/l) (GV)
Parathion-ethyl	Non-systematic herbicide. It is used as a fumigant and acaricide and as a pre-harvest soil and foliage treatment on a wide variety of crops.	No WHO Guideline Value.
PCB-Arochlor 1254	None found.	No WHO Guideline Value.
Permethrin-cis	Insecticide, acaricide, and insect repellent.	No WHO Guideline Value.
Permethrin-trans	Insecticide, acaricide, and insect repellent.	No WHO Guideline Value.
Propazine	Herbicide.	No WHO Guideline Value.
Simazine	Pre-emergence herbicide used on a number of crops.	No WHO Guideline Value.
Trietazine	Herbicide.	No WHO Guideline Value.
1,2,4-TCB	Termite pesticide and aquatic herbicide.	No WHO Guideline Value.
2,6-dichlorobenzamide	Control herbicide.	No WHO Guideline Value.

APPENDIX 2. EXAMPLE OF WSA ADVICE TO PESTICIDE USERS

INFORMATION LEAFLETS ISSUED BY DONEGAL COUNTY COUNCIL:

Guidance on the safe use of Pesticides to protect the Aquatic Environment

- Ensure filling and container cleaning takes place well away from drains and watercourses.
- Protect all watercourses with 6m grass buffer strips or 5m no spray/spread buffer zones.
- Apply pesticides with care. Do not overspray water-courses & avoid conditions where spray drift can occur.
- Do not apply pesticides if heavy rain is expected within 48 hours of application.
- Spray tank washings on to the crop or target area & ensure all cleaning activities take place away from watercourses.
- These measures will help to protect the aquatic environment including drinking water sources in your area

Donegal County Council, Water & Environment, www.donegalcoco.ie/protectenvironment

How pesticides get into water

Advice from Donegal County Council on safe handling of Pesticides

Storage

Sprayer Filling

Over Spray

Drift

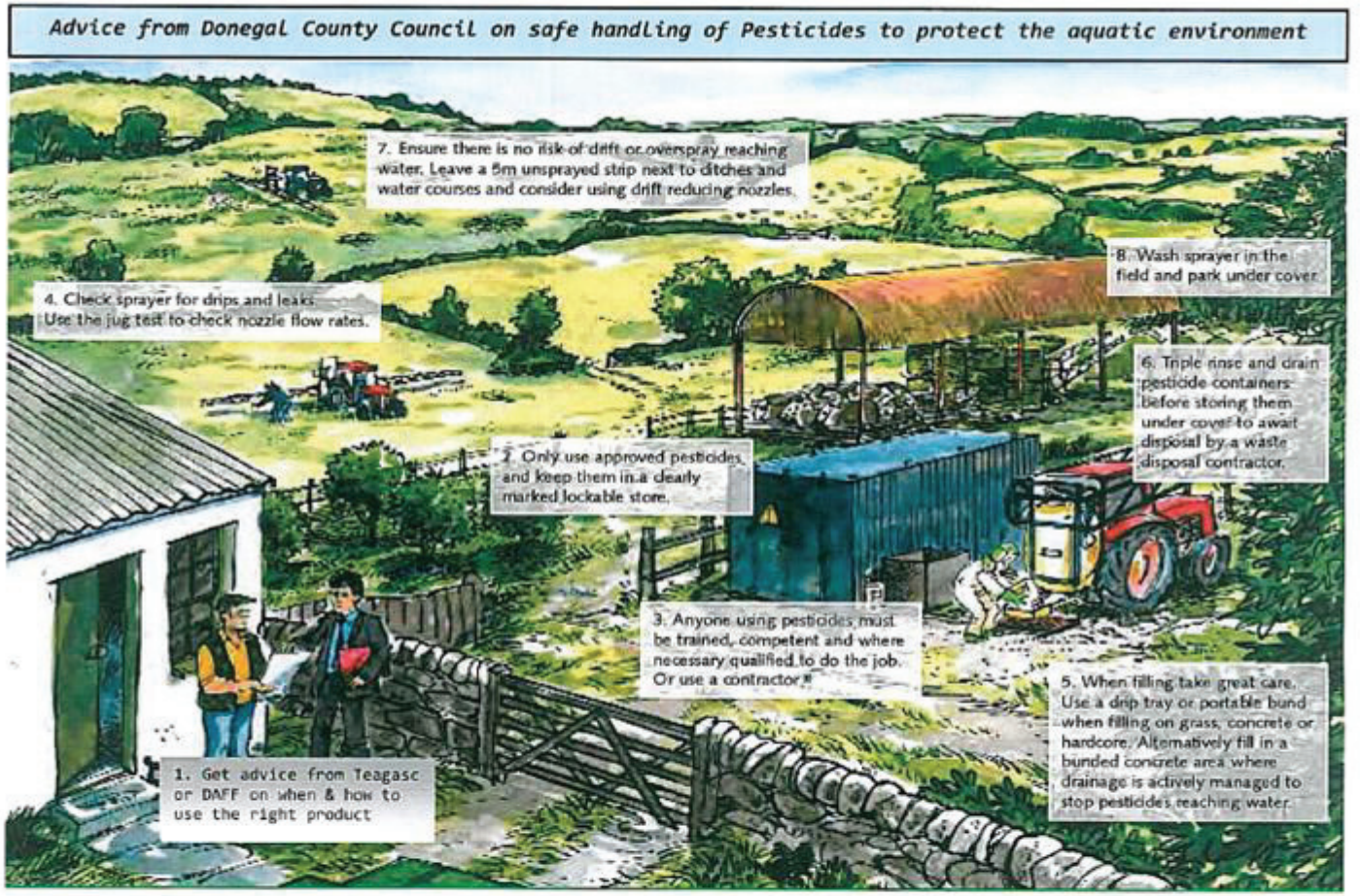
Drain Flow

Surface Run-Off

Cleaning

Disposal

For further information, please contact Donegal County Council, Water & Environment, www.donegalcoco.ie/protectenvironment


Advice from Donegal County Council on safe handling of Pesticides to protect the aquatic environment
7. Ensure there is no risk of drift or overspray reaching water. Leave a 5m unsprayed strip next to ditches and water courses and consider using drift reducing nozzles.
8. Wash sprayer in the field and park under cover.
4. Check sprayer for drips and leaks. Use the jug test to check nozzle flow rates.
6. Triple rinse and drain pesticide containers before storing them under cover to await disposal by a waste disposal contractor.
2. Only use approved pesticides, and keep them in a clearly marked lockable store.
3. Anyone using pesticides must be trained, competent and where necessary qualified to do the job. Or use a contractor.
5. When filling take great care. Use a drip tray or portable bund when filling on grass, concrete or hardcore. Alternatively fill in a bunded concrete area where drainage is actively managed to stop pesticides reaching water.
1. Get advice from Teagasc or DAFF on when & how to use the right product

In addition, the following precautions should be followed:

- Never dispose of spent sheep dip on frozen or waterlogged soils.
- Do not land spread between 1st November and 31st January (Zone C as per Nitrates Directive). If necessary store in a slurry or effluent tank.
- Do not spread adjacent to an open stream, lake or watercourse – maintain a buffer zone of at least 5 metres, but 200m in the case of extraction points for drinking water.
- For safety, all sheep dipping baths should have a suitable cover in place when not in use.

TEAGASC

Teagasc Advisory and Training Services,
Co. Donegal
Tel: (074)9131189/ 9121555/ 9721231/
9374733

Donegal County Council

Comhairle Chontae Dhún na nGall,

Central Laboratory

The Kube, Magheranan, Letterkenny,
Co. Donegal

Tel: 074-9122787

Water Quality in Donegal Rivers

Teagasc Advice on the Safe Disposal of Spent Sheep Dip

Teagasc

Donegal County Council

2011

River Water Quality

Water Quality Overview

Results of water samples have shown that water quality in some rivers in County Donegal has deteriorated significantly from what it was 15-20 years ago.

In the catchment area of upland rivers, the main causes being discussed are agricultural related activities, such as afforestation and the disposal of spent sheep dip. Many of the sheep dippers in these areas are quite old and in need of repair or replacement. In addition, their locations and construction often provide a high risk of water pollution. These old dippers were designed to be emptied by opening a valve, or removing a bung and allowing the spent sheep dip to flow out under the force of gravity, rather than the currently advised method of land spreading by vacuum tanker.

Teagasc Advice on the Safe Disposal of spent Sheep Dip

Spent Sheep Dip is a serious pollutant. The chemicals involved are highly toxic insecticides. It must never be allowed enter a watercourse or the groundwater. It must never be disposed of to a soak pit or dumped on "waste ground".

Sheep Dip Disposal

The proper procedure is to land spread by slurry tanker at a **dilution rate of one part spent sheep dip to three parts water or slurry** at a rate not exceeding 5m³ per hectare (440 gallons per acre) of spent dip. This is equivalent to 20m³ per hectare (1760 gallons per acre) of diluted dip.

Spent Sheep Dip must be land spread as soon as practicable after use. Farm animals should be excluded from the disposal area for at least 28 days.

Empty dip containers should be triple rinsed, when the dip is being prepared, and the rinsing liquid added to form part of the diluted dip. Empty rinsed containers should then be recycled through a permitted waste collector.

Sheep dipping tanks should not have a stopper or bung for emptying purposes. All existing such outlets must be permanently sealed.