BEST MANAGEMENT PRACTICES

"Preventing water contamination from point sources when using Plant Protection Products"

FOREWORD

Professor Wynne Jones
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Ensuring pesticide application methods used in the UK meet existing and predicted standards is a continuing challenge; a challenge that has been both a stimulus to our research and training and one that the whole industry has fully met at every stage. Harper Adams University College continues to be the major educational establishment in both pesticide application research and in training – doing much to ensure that those involved with pesticides remain at the forefront of today's industry and environmental needs.

These TOPPS Best Management Practices – directed at the prevention of point source pollution of water with pesticides – are critical to the continued responsible use of these essential inputs to arable, fruit and grassland farms. Compiling these statements with colleagues from many EU Member States has greatly enhanced their authenticity and we have been privileged that Harper Adams has been an essential component to their collective success.

Professor Robert Breach MBE
Independent Water and Environmental Consultant
Chairman- Voluntary Initiative Water Group

The UK Pesticides Voluntary Initiative (VI) is an industry-led programme, established to develop and promote best practice to minimise the environmental impact of pesticide use. The VI is supported by manufacturers, growers, advisors, and regulators, as well as water and environmental organisations and thus has access to a wide range of expertise and knowledge.

The VI's work on water protection has shown that pesticides can enter water from a number of different routes which vary depending on local risk factors, including weather, soil and crop type, as well as operator skills and farmyard practice. Training of farmers, spray operators and advisors to understand this and put in place effective mitigation techniques is thus a vital part of environmentally sustainable farming.

The publication of the TOPPS best management practice manual which builds on similar best practice experiences from across Europe is thus warmly welcomed and will complement the work necessary to counter diffuse losses of pesticides. I urge all pesticide users to adopt its advice.

Best practice better water protection

TOPPS: **T**raining the **O**perators to prevent **P**ollution from **P**oint **S**ources

The Best Management Practices contained in this publication have been proposed, reviewed and collated by experts in 15 EU Member States. They are intended as a reference source for all users of agricultural and horticultural Plant Protecting Products [pesticides] in the quest to reduce the risk of point source pollution of ground and surface water by these products. In addition, these Best Management Practice statements have – and will continue to - form the agreed, definitive source of all subsequent TOPPS information and training material. Some national and/or regional adaptation may be necessary to conform with and/or support local legislation, Codes of Practice and other initiatives that share comparable ideals to TOPPS. Any suggestions for improvement, more completeness and updating – that are relevant to the TOPPS project – are warmly invited

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ABOUT TOPPS

TOPPS: Training the Operators to prevent Pollution from Point Sources

TOPPS is a 3-year, multi-stakeholder project benefiting from the support of 15 European Countries and is funded under the European Commission's Life program and by ECPA, the European Crop Protection Association.

The intention of TOPPS is to reduce the losses of Plant Protection Products [especially pesticides] - from point sources to water - on a large co-ordinated scale across Europe; an activity that will, in the process, beneficially integrate all comparable earlier and current regional or national incentives.
All TOPPS information is - openly and without restrictions - disseminated to farmers, operators and spraying contractors on-line and through advice, training and demonstrations using direct contact and training agencies.

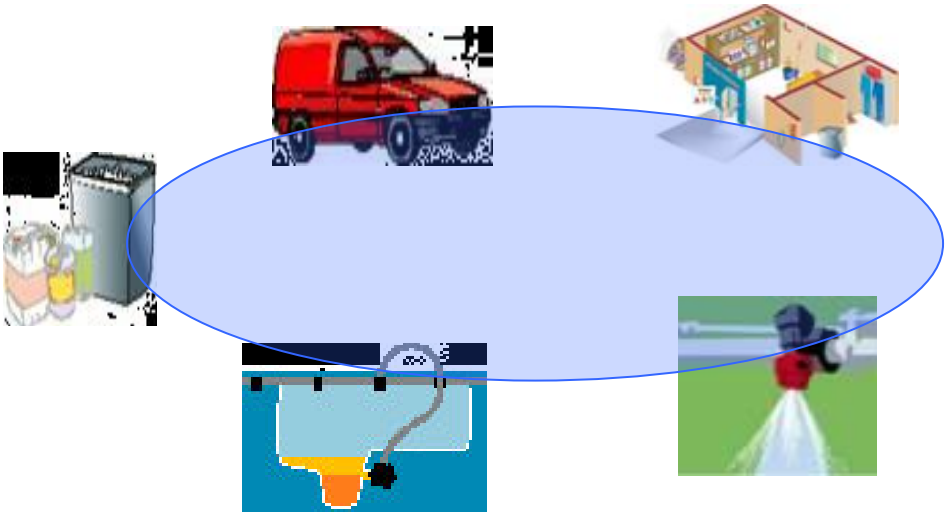
This ‘corner stone’ publication lists those Best Management Practices identified by TOPPS that will support the reaching of its goals.

Contents

I. TOPPS TIPS; Key Points Summarised

TOPPS Tips' is a quick introduction – or 'refresher' – to some of the key points that users of PPPs must remember in a shared quest to reduce risk of point source pollution.

Point Source pollution can occur at any stage PPPs [pesticides] are on your farm:



Transport:
To farm: Use your supplier's delivery service to get PPPs to your store
On farm: Use secure, lockable box for transport of undiluted PPPs
Use spill retaining loading/unloading areas
Have mobile phone with emergency contact numbers ready
Have spill retaining kit ready

Storage:
Use secure, identified and bunded store
Have emergency numbers and procedures clearly shown
Have emergency equipment - such as fire extinguisher and spill retaining kits – accessible for immediate use
Only store PPPs that have a planned use

Before spraying:
Use crop protection management plans that identify risks to water
Ensure operators are adequately trained and members of the National Register of Sprayer Operators [NRoSO]
Ensure PPP to be used is approved for intended use
Read product label carefully
Identify sensitive areas such as Source Protection Zones
Identify Buffer Zone needs
Plan mixing, loading and cleaning sites at farmyard or field
Check sprayer has been tested by the National Sprayer Test Scheme [NSTS], is clean, ready for purpose and all couplings secured
Check sprayer is capable of being cleaned after use; preferably in field of last use or in an area of the farmyard such that rinse water is retained for later treatment

Check sprayer with clean water for leaks, drips and where spray makes direct contact with equipment
Use a route to field that is of least risk to water by avoiding fords and tracks alongside any sensitive zones
Switch off pumps while travelling
Use bunded area in farm yard for filling and have spill retaining kit ready
Or site field-filling area at least 20 metres away from water and all sensitive zones.
Use portable bunds. Vary location each season
Avoid filling over hard surfaces where spills and splashes of PPP could be washed off to pollute drains and water
Calculate the amount of PPP and water that is needed
Only add water to sprayer using intermediate tanks or double check valves to protect mains supply from any contamination risks
Never leave a sprayer unattended and never overfill tank
Open PPP containers/packages and load sprayer without drips and splash
Use induction bowls to avoid any unnecessary carrying and lifting of PPP

During spraying:
Only spray when moving at calibrated speed
Never overspray water courses, wells and drains
Shut off sprayer when turning
Spray headlands last
Maintain correct boom height
Leaks and drips must be rectified as soon as it is safe to stop
Avoid drift and never overspray buffer zones
Avoid run-off by, for example, not spraying frozen or water logged soils

After spraying:
Clean sprayer in pre-planned area of field [TOPPS recommends]
Clean sprayer after each day of use, after completion of use and/or before moving it along public rights of way
Follow all manufacturers and PPP label instructions; normally internal sprayer surfaces are cleaned first then external surfaces
Clean mud from tyres before leaving field
If sprayer cleaned in farmyard, ensure no PPP residues/remnants are washed off into drains or water courses.
After use, park sprayer in a secure area and under a roof to protect it from, for example, rain washing off PPP deposits
Make records

Waste/remnant management:
Follow label recommendations or other instructions on disposal procedure for containers
Participate in authorised recycling schemes for containers. Use www.wastereycling.org.uk to find suitable contractors
Never burn or bury containers or packages
Separate out-of-date PPPs from the others and contact an approved waste disposal contractor
Never wash unwanted PPPs down the drain and never bury them
Reuse diluted PPP solutions if legally permitted
Never dump liquids or solids containing PPPs where they can reach water
Solid remnants – from processing diluted liquids/cleaning of filters/managing spills –
    If biodegradable; store securely for further degradation if permitted
    If non biodegradable; use approved waste disposal contractor

II. How to use this Manual

These BMPs are structured - on the basis of defined processes – and collated within the sequence of steps that may involve the proper use of plant protection products [PPPs] on farms and orchards.

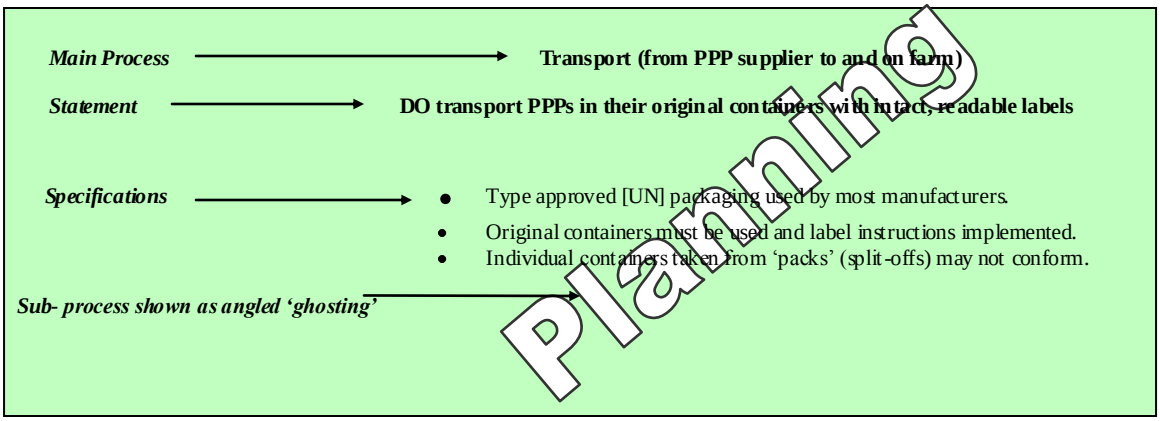
Six main processes are defined:

- Transport
- Storage
- Before spraying
- During spraying
- After spraying
- Remnant management

A general introduction to each **Main Process** is followed with summarised **sub-processes** that help prepare the reader for the listed specific requirements within coloured blocks.

Each sub-process/activity identifies what needs to be done [**Statements**] and how to meet that need [**Specifications**] in order to reduce point source pollution. Key commands such as 'DO' or 'USE' or 'ALWAYS' are intended to indicate the importance of such actions to the operators in the context of reducing point source pollution (see page 9).

Example



These agreed **statements** are the "European core" that are expected to be adopted by all Member States. In total, about 400 statements were submitted - from which an agreed 104 have been selected - to ensure every need and interest is addressed. In contrast, the **specifications** offered in these TOPPS BMPs should be considered as a proposal that are supportive to – but not replacing – any relevant local regulations, laws and codes of practice.

Levels of emphasis used by TOPPS

Requirements

MUST / MUST NOT or NEVER	Imperative - and may be a legal - requirement in Member States
DO / DO NOT	Highly recommended requirement
SHOULD / AVOID	Advised requirement

Safety

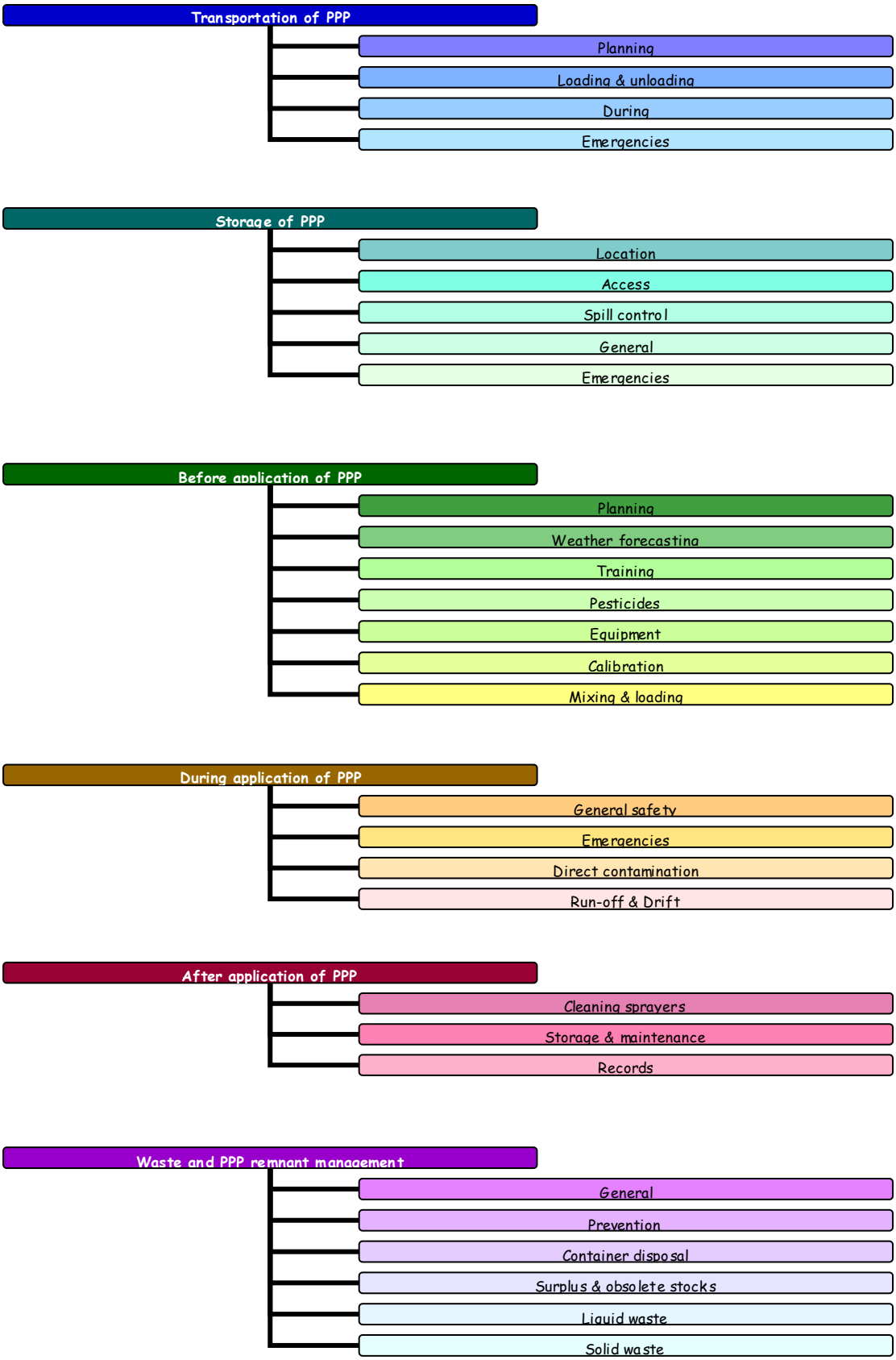
EMERGENCY	Critical for safety and damage limitation
ENSURE	Be certain
CHECK	Be sure

Ensuring Best Practices

USE	}	Terms used to identify proposed equipment/procedures for BMP
PROTECT	}	
PROVIDE	}	
KEEP	}	

III. Best Management Practices (BMPs)

Process and sub-process structure used by TOPPS



Main Process: Transport (from PPP supplier and on farm)

TOPPS BMPs are intended to identify where PPPs [pesticides] may pose a risk to water by point source pollution routes and suggest how such risks may be mitigated. They are compiled from expert views throughout the EU and take into consideration any existing technical limitations. Their intention is not to overrule local legislation but to support and complement any national legislation or existing approved practices that may exist. These BMPs – by necessity – are a dynamic process so regular updating on current practices and legislative needs is recommended.

The transport of PPPs from the supplier to the farm's PPP store and their subsequent conveyance around the farm in either dilute or undiluted states is the focus of this process. It is not the intention of these BMPs to explain in detail the responsibilities of professional distributors of PPPs but to note that the practices they follow - to minimise the risks of point source pollution – are very relevant to all users of these products on farms.

Professional distributors are likely to be well aware of their legal obligations when transporting PPP and, indeed, may be able to offer further guidance to those whom they supply. Recognising the requirements they must meet - will also greatly help to appreciate - your 'users' obligations.

Do note that transport - especially of hazardous products – is extensively regulated either at EU or at Member State level and is not limited to just agriculture. Some requirements relevant to PPP transportation on public roads are:

not exceeding the maximum PPP loads you can convey. When ever in doubt, do seek advice and/or support from your professional supplier (or other professional knowledgeable person/service).

taking all necessary precautions on public roads. Avoid problems from the start and strictly obey safety instructions given by your supplier and/or on product labels

avoiding spills within and on the vehicle and surrounding areas by use of proper handling equipment and procedures.

At the point of delivery of PPP, do check that the correct products are delivered with properly labelled packaging and in good condition. These precautions avoid the unnecessary movement of these products, reduces risks of contamination of your store, minimises the need to clean up remnants of spills, ensure no leakage and avoids unwanted stock.

Much focus has been recently directed to safer practices when conveying PPP on the farm and these are emphasised within the BMPs. The use of mobile stores for transporting undiluted PPPs is better recognised and, so too, is the greater care needed when conveying diluted PPP solutions. These BMPS will, therefore, remind the reader to consider the route that is taken to the intended treatment area as well as to check the sprayer for leaks.

Be prepared for emergency situations; All spills pose point source pollution risks. The manner by which they must be cleaned up and correctly disposed must be followed. As with all damage limitation activities, it is noted that the speed and level of appropriate response does much to reduce any risk to personal and the environment.

Sub processes:

Planning: Any movement of PPP on public roads must be planned and properly managed. Actions may need to be taken in the long or the short term.

Loading/unloading: Avoid any risks of damaging or weakening the PPP packaging at all times. Correct handling during loading/unloading, avoiding impact damage and using every measure to prevent the development of emergency situations must be used.

During: The use of mobile stores, ensuring vehicle stability and safety are essential to reducing risks of point source
pollution

Emergencies: Be prepared for emergency situations like spills, fire and hazards arising from accidents. Appropriately, quick responses will minimise impact of any emergency situation.

DO transport PPPs in their original containers with intact, readable labels

- Type approved [UN] packaging used by most manufacturers.
- Original containers must be used and label instructions implemented.
- Individual containers taken from 'packs' (split-offs) may not conform.
- Keep PPPs separate from driver and passengers with a chemical and vapour proof barrier

DO have mobile phone and emergency telephone numbers with you

- Have emergency numbers on mobile phone and with you at all times
- Police, fire or ambulance: 999
- Use Environment Agency Hotline when risk of PPP directly/indirectly reaching water: 0800 80 70 60
- Always know your location

DO have plans and equipment for use in emergencies such as road accidents

- DO have list of PPPs and note transport warning symbols
- Ensure instant availability of emergency equipment to cope with spills and leaks

AVOID transporting unnecessarily large amounts of PPP

- Only transport the quantities needed for the immediately planned activity
- All PPP must be transported within secured cabinets or containers mounted on the outside of the vehicle or on a trailer.
- Mobile stores must only be stocked from fixed stores and the PPP used within 24 hours.
- Other regulations may be enforced for PPPs labelled 'Toxic', 'Flammable' or 'Corrosive'.

DO avoid impact damage whilst on/off loading

- Manual and/or mechanical movement of PPPs must not damage their packaging
- Check load deck, pallets and stillages are free of sharp protrusions
- Check pallets, packs, containers are free of damage before/after loading

DO ensure load is safe and secure before departure

- Use a clean, dry, safe, spill retaining load area in vehicle
- Implement specified handling requirements such as 'This Way Up'.
- Follow guidance on stacking heights
- Prevent free movement of containers within load area
- Avoid excessive stress on containers with securing restraints

DO safely transport PPP around farm in mobile stores

- Make sure mobile store is lockable and mounted securely
- Check mobile stores are able to contain any spills or leaks resulting from vibration damage en route.

DO safely transport spraying equipment/ PPP and ensure vehicle stability

- Sprayers containing undiluted or diluted PPPs must not pose hazards en route
- PPPs, waste/remnants, discharged containers must be stowed with closures refastened and uppermost
- Check coupling pins and other fastening devices for security before moving.
- Check tank fastenings to avoid vibration damage en route.
- Correctly ballast the vehicle and balance load in case of mounted sprayers.
- Drive smoothly and avoid uneven roads if possible.
- Do not transport PPPs with humans, animals, farm produce or animal feed
- Know emergency procedures.

DO ensure no accidental/unintended losses of PPP can occur

- PPPs must not leak, slop or – in any way – pose hazards en route.
- Tank lid must allow air in but not permit the leakage of any liquid.
- Make sure hoses and nozzles are not leaking and the tank is not overfilled.
- Close all valves that direct spray liquid to booms.
- Secure all valves against accidental opening during transport.
- Ensure spray tank liquid indicator visible by operator to detect losses en route.
- Ensure tank closures, couplings and valves controlling liquid flow are secured.
- Do rectify/adjust equipment problems immediately.

DO not drive through or in water courses

- Use bridges or tunnels – for preference - to cross water courses.
- If unavoidable, clean tyres and recheck sprayer for leaks and external deposits.

DO be prepared for and manage spills safely

- Wear personal protective equipment [PPE] as defined on label and/or Safety Data Sheet
- Separate damaged from undamaged containers/packs
- Place damaged containers/packs within a sealable container/sack
- Bund and absorb spills
- Sweep up contaminant and place within sealable container/sack

Main Process: Storage

TOPPS BMPs are intended to identify where PPPs [pesticides] may pose a risk to water by point source pollution routes and suggest how such risks may be mitigated. They are compiled from expert views throughout the EU and take into consideration any existing technical limitations. Their intention is not to overrule local legislation but to support and complement any national legislation or existing approved practices that may exist. These BMPs – by necessity – are a dynamic process so regular updating on current practices and legislative needs is recommended.

Conditions governing the safety of PPPs that are stored on farms are regulated to ensure personnel and environmental safety. These TOPPS BMPs are not directed at professional suppliers who have other conditions with which to conform but to those who store PPPs for their own use. However, do note that when farmers sell PPPs they may then become 'professional' suppliers and may need to conform with more demanding requirements such as the BASIS Certificate for Storekeepers.

Farm stores are usually within, linked or immediately adjacent to farm buildings and hence part of the farm's building "infrastructure". New buildings or ones being modified must take into account all relevant legislation and safety issues as well as those daily storage management aspects that are related to the protection of the wider environment. Some of these demands are legally enforced; some requirements are self-evident whilst some are less clear. In addition, mobile stores must meet all the requirements of a fixed store as well as being sufficiently robust to transport PPP to distant locations on the farm.

Few major accidents with PPP-storage facilities occur but - when they do – the consequences for liability and to the environment can be significant. Inappropriate storage conditions for PPPs have resulted in personal injury – especially where there is poor access management, point source pollution, environmental risks and fire. Do also note that fire risks can be generated from within the store or from outside. Flooding of the store may also cause uncontrolled release of PPP and – with today's weather patterns - is an increasing environmental risk.

More commonly, sources of point source pollution have been attributed to drains and other outlets from within the store that were –unknowingly - formerly used as soakaways or connected to main sewage systems. It is critical that all drains within stores discharge into a safe holding chamber whose contents can be properly managed. In the every day use of PPPs, some small volume, accidental spills and splashes – often of undiluted product and unseen to the eye – will occur and since stores are regularly cleaned, these small losses must be contained to avoid point source pollution.

Sub processes:

Location: Do locate stores in an area that is not environmentally sensitive. If there are no alternatives then building specifications may need to be raised to prevent potential risks Location is crucial to safety, labour efficiency and accessibility; a decision likely to demand professional advice and knowledge. Keep working distances - between the store and the areas used to mix/load and/or the store/compound used for containers/packaging - to a minimum. Shorter distances increase safety and labour efficiency.

Access: Laws/local regulations and other conditions may specify minimum standards for door labelling, access rights for entering the store and its general accessibility to emergency services. Appropriate accessibility will also help protect PPP containers from damage whilst moving PPPs in/out and will isolate and contain spills.

General: Requirements for the external and internal building as well as any fitments within the designated store are identified within these BMPs since appropriate structures will help minimise the risks of PPPs polluting water.

Know the maximum amount of PPPs you can store; a limit that may be related to environmental permits, geographical restrictions such as drinking water extraction areas. Within that upper limit, only store quantities applicable to your predicted and planned use.

A PPP store is exclusively for PPPs and, if local legislation allows, for short term storage of emptied and cleaned packaging and small volume managed spills awaiting collection by authorised contractors.

Spills: Major accidents are dealt with under the "emergency" section. This topic describes the management of occasional small volume spills and their safe disposal. Spills must never be ignored for they are a major risk to point source pollution and must be cleaned up promptly and effectively; an activity that causes extra work and disposal problems.

Do not allow any PPPs to be emitted – either intentionally or by accident - into drains and gullies connected to surface water and sewage systems.

Emergency: Be prepared for emergency situations such as fire, flooding or any other accidental hazard. Quick and appropriate responses may prevent personal injury as well as limit damages. Do have appropriate personal protective equipment to wear and spill absorbing kits ready for immediate use at all times.

DO locate store away from all sensitive zones to minimize risks

- Check with Environment Agency and local Authorities for suitable location
- Locate store away from high risk zones for water [Source Protection Zones]
- Implement HSE advice for farm PPP stores
- Stores must be constructed to be protected from hazards and not pose risks

DO locate stores away from risks of fire, floods and damage

- Stores should not be located in areas at risk of fire, flood or damage

DO provide appropriate mixing and loading facilities adjacent to store

- PPPs removed from store must always be in sight when being prepared for use
- Mixing and loading sites must be capable of retaining all spills
- Mixing and loading sites must have collection facilities for emptied containers and packaging

DO store PPP within lockable building or cupboard

- Ensure access from outside through openings such as windows is not possible
- Use external secure lock with internal emergency release facility
- Never leave PPPs unattended when not in secure store

DO NOT leave the store unattended and/or unsecured

- Stores must be secure and protected from unauthorised access
- Stores must not be left unattended when open
- Stores must be managed by competent person

ALWAYS display appropriate safety and hazard signs at store entrance

- Clearly identify on an external surface that the store is used for PPPs
- Use general danger signs such as [!] and/or 'Skull and Cross bones' if appropriate.
- Display 'No smoking' or 'Smoking and naked flames forbidden' signs on exterior side of door

DO keep instructions on hazards and emergency procedures at store entrance

- Instructions identifying all hazards and emergency responses – for all stored PPP – must be within store, visible from entrance and at eye level

Do have emergency procedures - known to key staff - practiced and in place

- Detailed clear emergency plans should be kept separately from the store in a secure place such as that used for the store key.
- Emergency plans must show access routes to PPP store [location], emergency telephone numbers [as shown on store door] and a list of those PPPs in store and their quantities

ALWAYS use fire resistant stores

- Check with local regulations and fire brigade
- Walls, doors, roof and all construction material must be fire resistant
- Protect load bearing metal members from heat
- Fire break walls should extend to roof
- One hour internal and external fire resistance required in remote places and/or areas posing external risks such as forest fires
- Thirty [30] minute minimum fire resistance may be permitted where rapid response by emergency services expected

Do ensure stores keep stored PPP dry and protected from frost, excess heat and direct sunlight

- Stored PPP must be kept dry
- Stored PPP must not be exposed to frosts nor temperatures that exceed 40^{o}C
- Stored PPP must not be exposed to direct sunlight
- AVOID storing PPPs such that their containers/packaging can be damaged

DO ensure stores are bunded and/or equipped with waste collection system

- Stores must be bunded such that the total quantity of stored PPP is completely and safely retained
- New stores of more than 1 ton capacity must have a dedicated holding tank of at least 110% (185% if in water sensitive area, category 'high') of the maximum stored volume of PPP such that water used to suppress fires and/or spills is also safely retained
- Stores of less than 1 ton capacity must have a dedicated holding tank of at least 10% of the maximum stored volume of PPP

DO seal floors and disconnect drains not used to channel waste to a holding tank

- Sealed surfaces must be impervious to PPPs as solids and/or in solution and should extend to and be continuous with the walls damp proof course
- Seal and disconnect any drain, gully or channel that does not lead to a holding tank whose contents are to be disposed by licensed authorities

DO ensure floors of stores are secure, not slippery and easily cleaned

- Floors must be fixed, rigid and not slippery
- Floors must be impervious to liquids
- Floors must be smooth and without holes or depressions that could retain liquids
- Floors must not have excessive slopes or humps that create instability for containers or persons

DO use non-absorbent shelves

- Avoid storage surfaces with sharp points and/or edges
- Take particular care with PPP contained in sacks [or similar material] and avoid sharp corners or obstacles.

DO store PPPs in original packages with their original, intact and readable labels

- Stored PPPs must be in their original containers and packages with their labels intact and readable

DO equip stores with facilities for measuring weights and volumes of PPPs

- Stores must have appropriate and dedicated measuring facilities for PPPs
- Measuring facilities must be located within a bunded area such as that within the store

DO store emptied containers and packages in a secured, dedicated and covered compound

- Emptied, cleaned containers must be stored upright in a dedicated compound
- The compound must provide cover and be secure
- The compound must have drip collection facility or be within bunded area
- Foil seals and caps may be kept within dedicated bag or container in this compound

DO repack leaking and/or damaged containers

- PPPs within leaking/damaged containers must be safely decanted into another appropriate container in good condition
- Repacked PPPs must be immediately labelled with products name and any hazard warnings
- Repacked PPPs should be preferentially used to minimise time in store

DO equip stores with facilities to safely manage spills

- Personal protective equipment [PPE] for use when managing spills must be available
- Containers of absorbent inert material such as sand or sawdust together with floor brush, dustpan and plastic bags must be clearly located and available

DO retain and safely dispose all spills, splashes and other losses immediately

- Be prepared for and know how to manage any spills, splashes and losses
- Check safety data sheet and/or label instructions for guidance on spill management
- Instructions may advocate use of dry sand, cat litter (for inflammable PPP) or sawdust to bund and absorb spills
- Contaminated material used in spill management must be placed in sealed, labelled container in section of store used to retain obsolete PPPs
- Spills on soil should be absorbed with sawdust and – together with contacted soil – scraped off and distributed at an appropriate rate within the PPP's approved treatment zone
- Absorbed spills can be placed within a bio-remediation system
- Absorbed spills can be placed within sealed containers for incineration by specialist hazardous waste contractors

DO NOT wash PPP spills into drains or by any means that discharge into ground or public sewage systems

- Stores must have facilities to contain any spills, splashes, leaks and other PPP losses
- Stores must use dedicated drains that collect and channel all PPP losses and water - used for cleaning - into a holding tank
- All contents of holding tanks must be disposed by authorised waste disposal organisations or by using approved 'clean up' methods

DO have a WRITTEN EMERGENCY Plan

DO have a written emergency plan (See page 26)
DO ensure all PPP users are trained in emergency procedures
DO ensure all PPP users understand and have rehearsed their own action plans

DO call emergency services if store at risk from FIRE

- Immediately call emergency services if there is evidence of fire within or adjacent to store
- Do not attempt any damage limitation until trained personnel can directly supervise your actions

DO NOT allow any FIRE controlling actions to contaminate ground/surface water

- Powders, foam and/or fine spray jets may be an appropriate and safe means of extinguishing fires without increasing the risk of PPP loss to the environment
- Do avoid the use of powerful water jets that could worsen the risk of container/packaging damage
- Do avoid excessive volumes of water to control in-store fires
- New stores of more than 1 ton capacity must have a dedicated holding tank with a capacity =>110% [185% if in water sensitive area] of stored volume
- Do contain and collect all contaminated waste for safe disposal

DO take precautions to minimise flood damage

- DO assess risk with Environment Agency
- Consider if stored PPPs can be at least 50 cm above max flood heights for past 100 years
- Consider if store can be better located or modified to minimise flood damage risks

EMERGENCY WRITTEN PLAN for your PPP Store

Location of:

Hazardous and/or combustible materials

Water course and drains

PPPs Material Safety Data Sheets

Emergency equipment

Spill kit

Skin and eyes decontamination equipment

Procedures for

Spillage

Personal contamination

Suspected poisoning

Fire

Theft

Site plans and access routes

Main Process: Before Spraying

TOPPS BMPs are intended to identify where PPPs [pesticides] may pose a risk to water by point source pollution routes and suggest how such risks may be mitigated. They are compiled from expert views throughout the EU and take into consideration any existing technical limitations. Their intention is not to overrule local legislation but to support and complement any national legislation or existing approved practices that may exist. These BMPs – by necessity – are a dynamic process so regular updating on current practices and legislative needs is recommended.

Risks from PPP use – including point source pollution - are avoidable with careful planning and preparation. Indeed, risks are assessed during the products approving stages and – if relevant – are written within its label recommendations. Recognising and implementing these label needs are, therefore, critical to avoiding point source pollution so need to be understood at the planning stage – perhaps, as part of the farm's agronomic advice and/or before the product is ordered.

Planning within the overall farm management strategy - should include the longer term risk reduction of PPPs accidentally reaching water. Examples can include mapping of sensitive areas for water, capping of wells and the management of hedgerows and field margins. Other decisions may need to be more immediate such as modifying nozzle choice to local conditions. Hence, some planning actions are made – perhaps - once every decade whilst others are done more frequently and before the job starts.

The decision whether to use contractors or do your own spraying or which sprayer to use or buy is complex. Whichever option is used – it is important to know that the equipment used on your farm has a vast impact on how PPP are applied and risks for water pollution.

Sprayer size and complexity today makes these machines a long term investment and must satisfy a wide range of needs; efficiency, efficacy and safety are some of the criteria that are so important that their performances are increasingly specified within International Standards. Check with your dealer whether the machine you may purchase does comply with all relevant specifications such as those for nozzle distribution, residual spray volumes, induction bowl capacities and so on.

Be also aware of advances in sprayer designs and note, for example, that induction bowls have, for many years, offered easier and more effective container cleaning facilities that are now an integral component. But, more requirements are being adopted. Are you going to be able to clean the sprayer, as is now being proposed – internally and externally – in its last field of use?

Any sprayer can only be effective, efficient and safe if properly checked and calibrated before and during use. Routine checking avoids problems and time lost whilst greatly reducing any risks of point source pollution. In addition, calibrating is very cost effective; it will minimise the amount of PPP to use for the intended field treatment through a better distribution over the intended target surfaces, a greater ability to spray 'on time' and the avoidance of excess spray liquid.

Weather conditions in the field can greatly influence the quality of your work and safety to ground and surface water. Get good forecasts and do check field conditions before preparing spray solutions.

Sub processes:
Planning: Agronomic assessments, management of operator's time, equipment availability, the supply of PPPs, measures to protect sensitive areas, budgets and any structural changes all need to be considered before any field spraying takes place.
PPPs: Only use Approved PPPs and fully implement all the Conditions of Use that are relevant for your intended purpose. Do follow any additional guidance that may also be offered or made available to you
Training: Operators may be required to demonstrate that they are safe and competent to use PPPs. It is in everyone's interest that these products are used exactly for their intended purpose in the manner described on the products label; a requirement that appropriate training will ensure and – in some countries – will need to be independently validated.
Equipment: The choice, condition and use of spray equipment is critical to the avoidance of point source pollution. Much progress has been made by manufacturers and attention is drawn to these improvements.
Inspection & Calibration: Inspection of sprayers includes a third party check, either in a mandatory or voluntary scheme. Inspection should be in line with European Standard on inspection of sprayers (EN 13790 - 1& 2). The prescribed dose, water volume and spray quality (drop size) of the PPP to be applied, actions to be taken in the field - and after spraying - may all have to be followed and recorded to satisfy all interests. This calibration may be done by the operator - or by others - that can competently ensure the selection and adjustment of the sprayer for its intended use and its proper daily functioning.

Mixing & Loading: PPPs have to be moved from the store, prepared for mixing and filling in the sprayer with water [in the correct sequence and quantity] and – to do so – without damaging the containers, without risk of spills or splash or leaks. This activity is stated to be the source of 40 to 70% of all surface water pollution in the UK with PPPs and will prompt many improvements to current practices.

Weather forecasting: Weather can indirectly and directly risk PPP losses to point sources. Rain, for example, may stop the timely use of a prepared spray solution that then has to be safely retained [if possible] until it can be sprayed. Rising wind speeds may stop spraying because of drift and downwind fallout over surface water is another example. It is therefore critical that existing and likely future field conditions are known before preparing spray solutions and that a plan is in place in case of unexpected weather conditions occurring to stop the intended field treatment. Note also that losses of PPPs by diffusion and soil erosion can also be closely linked to weather related factors.

ALWAYS pre-plan and organise spraying activities

- Do ensure that plans – both long and short term – have been made for the farm, its infrastructure and its staff to minimise every risk of point source pollution with PPPs are recognised and in place
- Do have Crop Management Plans (CPMP) or LEAF Audits that provide structured approaches to environmental assessments
- Do consider the implications of your PPP use on others - such as bee keepers

DO identify and record the location of all environmentally sensitive zones

- Do plan for the protection of water [and any of its sources], wildlife and the environment
- Do follow advice on Environmental Information Sheets that may be available for the PPP and can be downloaded from VI website
- Make a survey of the farm environment and wildlife
- Identify sensitive areas such as Source Protection Zones [SPZ I, II and III] for risks of water pollution and damage to its fauna and flora
- Use topographical maps to assess risks of flooding, run-off and drift
- Do adopt strategies to protect all sensitive zones particularly noting the needs of Local Nature Reserves (LNR), Marine Nature Reserves (MNR),Sites of Special Scientific Interest (SSSI), Special Areas of Conservation (SAC)and Special Protection Areas (SPA).

Do locate, construct and effectively cap wells

- Follow national regulations on the location, design and construction of wells
- Drill new wells only where permitted
- Drill wells away from areas that are flood prone and/or with high water table
- Drill new wells away from sites used to mix and load PPPs
- Wells must be sealed between borehole and casing to prevent contamination
- Wells must protrude above ground level and be capped to prevent direct or indirect contamination
- Unused wells must be effectively sealed and capped to prevent contamination

DO assess whether current and predicted field conditions will risk safe and effective PPP use

- Check existing wind speeds - and those predicted - within the intended treatment area
- Avoid higher wind speeds that threaten drift loss of PPP from treatment area, lessen accuracy of spray deposition and increase operator/bystander exposure
- Avoid conditions that may cause spray loss by temperature inversion such as that developed in high temperatures and still air
- Check PPP label for advice on existing and predicted precipitation levels that may/may not be tolerated
- Establish conditions such as frost predictions, precipitation, within intended field - for any predicted time period stated on label - to ensure compliance with conditions of use for that product

DO assess whether ground conditions will influence risks of PPPs losses

- Existing and predicted weather and ground conditions must be assessed
- PPP labels may identify which ground conditions pose risks
- Spraying PPP onto ground that is frozen or covered with snow could be a risk
- Do not spray water-logged soils. Exceptions include some PPPs approved for use in aquatic situations

ONLY USE approved PPPs and comply with all their Conditions of Use

- Do ensure the PPP is Approved and permitted for its intended use
- Do ensure all its Conditions of Use are understood and can be fully implemented
- Do check all relevant Safety Data Sheets
- Do ensure conditions relevant to access to treated areas (re-entry)are met

ONLY USE Approved PPP mixes

- Only use mixes of PPP if approved
- Check PPP labels and follow all its Conditions of Use in mixes
- Only use approved mixes in lowest possible numbers and occasions
- Only use adjuvant and/or additives following label/expert advice
- Non-approved products/mixes may be illegal
- Non-approved products/mixes may cause chemical/physical reactions that further risks safe use such as sedimentation/blockage within equipment and need for hazardous waste disposal

DO ensure the sprayer operator is adequately trained and prepared for PPP use

- Operators may – almost always - have to be adequately trained, tested and registered before using PPPs
- Guidance on any training needs, certificates of competence is available from the UK's NPTC [formerly the National Proficiency Tests Council]
- Operators membership of the National Register of Sprayer Operators supports validation of operator competence for PPP use in UK
- DO ensure COSSH assessments have been made and control measures such as PPE are available

USE only inspected sprayers

- All sprayers should be registered as fit for use and independently verified
- Inspection requirements may vary between Member States but all should require a third-party assessment by qualified personnel.
- UK tested sprayers are registered with the National Sprayer Testing Scheme

DO ensure sprayer is clean and functions correctly - especially after longer periods without use and/or being used for first time

- Make a full visual examination of sprayer for cleanliness and obvious defects
- Check for deteriorating pipes, joints and all pressurised parts
- Replace all suspect components
- Check sprayer using clean water only and – with all suitable precautions - pressurise system to maximum as stated by manufacturer

DO use sprayers designed to assist easier, safer use

- Colour coded, multi-turreted, bayonet fixed nozzles assist with nozzle identification and change for contrasting uses
- Hydraulically controlled booms reduces physical effort and the need to leave the protected cab environment to set spraying heights or when folding
- Induction bowls make PPP sprayer loading safer and quicker
- PPE lockers allow operators to keep these safe and available at all times with sprayer
- Hand wash facility will help keep hands/gloves clean when working on sprayer

DO use sprayers with spray tanks protected against accidental opening

- Lids – and other spray tank closures – must not allow accidental or unintentional release of any PPP during normal use

Do use sprayers that can be effectively cleaned in last field of use

- Use sprayers that can be effectively internally cleaned with self-contained systems
- Only use sprayers that retain minimal volumes of non-sprayable and non-cleanable PPP solutions
- Internal cleaning must be capable of diluting =<1% any retained PPP solution

DO use sprayers that can be safely emptied as and when needed

- Operators, service technicians as well as the equipment and work environment should not be contaminated when sprayers are being emptied of PPPs
- Any PPP liquid must be collected in properly labelled containers
- Follow guidance on storage and disposal of this PPP liquid as described in Waste/Remnant management

Equipment

ALWAYS verify and/or calibrate sprayer for the appropriate and optimised application of PPPs

- Do follow label guidance and any supporting literature for the advised application method
- Dose will be prescribed but, so too, may water volume and drop size [spray quality] be specified.
  PPP advice may also be given to nozzle types and sizes, spraying speed, boom height and other factors

DO calibrate and maintain sprayers in areas without risk of ground/surface water pollution

- Use areas away from any risk of ground/surface water pollution
- Calibrate over biologically active ground such as a grass field or use a bunded filling and cleaning site
- Use clean sprayers and only water to calibrate
- Leak testing of sprayer under pressure and/or measuring nozzle emissions – can result in the work area becoming saturated. Avoid such liquid loss from this work area
- Avoid excessive drift whilst calibrating with use of ‘same size’ nozzles that produce coarser sprays during early calibration stages
- Avoid excessive drift whilst calibrating by keeping booms on field crop sprayers low and – where appropriate – turn off air assistance

Calibration

DO verify and calibrate sprayer with clean water

- Ensure full safety to operator, bystanders and the environment when calibrating. DO note that operators will make direct contact with surfaces such as nozzles that may have been extensively contaminated from earlier PPP use
- Sprayers must be calibrated - before PPP use – only with water
- Water quality used must not pose risks to operator or the environment
- Use water without debris and other particles such as sand that could block nozzles and filters or cause any malfunction of equipment
- Calibration settings – derived with water alone – may be adjusted, as advised with the product – when spraying, for example, more viscous/denser solutions

DO use appropriate water volumes for the intended spray application

- Use water volume rate(s) specified by label/guidance notes for the PPP to be applied
- Volume rates must be followed for they may critically influence efficacy, crop selectivity, drift, operator/bystander exposure, consumer safety
- If advised, adjust water volumes within these specified rates to enhance, for example, spray retention, crop penetration and/or to meet needs of cropping schemes or other protocols or to minimise risks of climatic influence
- Using lower water volume rates - at maintained dose levels - will increase concentration of PPP solutions being sprayed; a risk that must be assessed
- The spraying of some PPPs at concentrations - beyond those specified on its label -may not be permitted by the approving authority
- Using water volumes under or above those specified on the PPP label may introduce further risks such as 'loss of warranty rights'

DO verify and/or calibrate whenever appropriate

- Do note that calibration frequency/need influenced by many factors
- Calibrate when erosion and/or corrosion of nozzle orifices is likely after the hours of use specified by manufacturers is reached
- Calibrate when tyres or the soil conditions - in the intended field of use - have changed
- Calibrate when equipment such as the sprayer's computer, pressure gauge has been changed
- Calibrate when using a spray liquid – such as liquid fertiliser -whose density contrasts with that of water
- Verify calibration in intended field of use
- Monitor sprayer performance whilst applying PPP solution over the intended treatment zone

Do adjust equipment to ensure its optimised safe use

- Use just those nozzles on a boom array that will direct their spray to form the intended swath width. In particular, ensure full [no spray] compliance of sensitive zones when spraying adjacent swaths
- Turn off those nozzles that would direct spray beyond the intended swath - if necessary - using 'end' nozzles with reduced pattern widths
- Turn off nozzles that would emit spray onto areas - such as fallowed land between cropping beds – to which that PPP is not intentionally targeted
- Adjust air volumes/speeds on sprayers with air support – as instructed by manufacturers – to crop canopy and other specified conditions of use

Do precisely calculate the total amount of PPP and water needed

- Use data from label, calibration and intended treatment area to determine the required volumes of PPP and water
- Consider not spraying some of the proposed treatment area and using this for 'in-field' sprayer cleaning activities
- DO NOT prepare more PPP solution than is required. If, in doubt, prepare less

DO NOT leave PPPs unattended and not in a secured container

- PPPs must only be taken – as required – from the store [fixed or mobile] for immediate use only
- Unsecured PPPs must not be left unattended either in their containers, the sprayer or having been prepared for use

DO NOT - install equipment for or - mix or load sprayers in or near areas that can pollute ground or surface water

- Follow guidance on where to mix and load PPPs for use
- PPP label may state specific or general requirements to keep a specified distance from sensitive areas
- Do NOT mix or load near water courses or wells or where precipitation may carry spills to such areas
- DO check local legislation on site specific perimeters such as those that may be applicable to drinking water extraction
- DO make a risk assessment and record the details of mixing/loading sites used
- DO use bunded mixing/loading sites that are 4/10/20m away from TOPPS rated water sensitive categories Low/Medium/High respectively
- Use of areas NOT BUNDED – such as in fields- must be on biologically active soil >20m away from surface water, wells, drains and springs. In addition, DO NOT mix/load over very permeable soil, shallow aquifers or where soils risk erosion or slope towards sensitive areas

DO NOT fill sprayers with water – using direct methods - from wells, main water supplies or any source used for drinking water

- Using water from wells, main supplies or any source used for drinking water, must only be done with methods that can not contaminate such sources with PPPs
- Techniques for filling sprayers with water must not form a continuous link/bridge between these sources and the spray solution being prepared
- Air gaps must exist between supply pipes from such sources and the PPP solution being prepared
- Use intermediate water supply sources such as bowser/nurse/mobile tanks for filling sprayers

DO NOT allow PPPs to be a risk to ground/surface water when loading

- DO NOT overfill – or let foam escape from – the spray tank
- DO note that filling times of smaller tanks - such as those on knapsacks – may be very short
- Maximum liquid volumes in sprayer's tank[s] must not exceed that as rated by its manufacturer. These rated spray tank volumes ensure the excess capacity [typically a further 10%] minimises risks of slops and foam escape
- DO NOT use tanks such as rinsing tanks or other containers on sprayers for PPP use
- DO use easily read and precise tank scales to monitor filling
- DO consider use of tank fill alarms and monitors
- DO consider use of portable bunding systems
- DO remove any PPP spills- effectively and safely - immediately

DO prepare PPP solutions just prior to their immediate use

- Safety of PPP use is increased when delays between mixing/loading and spraying are minimal
- Avoid preparing PPP solutions if there is risk of delays due to nightfall, weather or difficulties with sprayer, its operator or its transport

DO choose PPP containers that avoid risk of loading/mixing area becoming contaminated

- Use appropriately sized *complete* packs – when ever possible - to load the intended quantity
- Minimise the need to measure, transport and store split PPP packs to/from the loading area
- Use graduated PPP containers to dispense part loads when needed
- Use PPP containers - such as those with 45 or 63 mm wide openings –that pour easily and without 'glug' or splash
- Use containers that freely drain all its contents
- Use dedicated foil cutters to remove secondary seals

DO NOT damage containers/packaging when opening

- Use dedicated knife to carefully open bags and boxes to avoid any uncontrolled release of PPPs
- Use special cap and seal removers
- Use foil cutters to remove secondary seals

DO load PPPs for dilution in the method and order advised

- Follow PPP label advice
- Typically, PPPs must never be loaded into an empty spray tank.
- Do load when main tank is at least half filled with water
- Do ensure that agitation levels are appropriate to the PPP being loaded and that a true, uniform dispersion is gained without sedimentation and/or surface deposits
- Do seek guidance when mixing individual PPPs and/or using water volumes beyond that advised
- Do seek guidance when mixing contrasting formulations. Where no advice given then consider the following sequence: Water soluble bags, Water dispersible granules, wettable (soluble) powders, suspension concentrates, emulsifiable concentrates and adjuvants
- DO follow any specific guidance for the loading of WDG, powders and water soluble sachets

When necessary – use dedicated measuring equipment

- Self- measured quantities must be determined only with dedicated equipment
- Measuring equipment must be labelled for its exclusive use
- Measuring equipment must be safely rinsed such as over the open induction bowl or - when not fitted - mesh/filter in tank main opening - immediately after use

DO load/mix PPPs from a stable and safe operating position

- Operators must not climb or excessively stretch to move PPPs from [fixed or mobile] store to loading position
- Loading position must be within arms reach and at waist height of operator
- Raised working platforms must be safe, non- slip and non liquid retaining as well as being easily cleaned

DO avoid operator/bystander exposure

- Use the appropriate personal protective equipment advised on PPP label or with its supporting literature
- Avoid loading - especially powders - when wind could move PPP particles to operator or bystander

DO load and clean PPP containers with integrated sprayer equipment

- Use low level induction bowls with integral container rinse facility
- Check with manufacturer that bowl loading/container rinse facilities are appropriate to your intended PPP use
- PPP labels may detail specific requirements to load/clean – for example, larger pack sizes
- Always load PPPs into induction bowls such that there is no risk of spill or splash or undue equipment contamination
- Visually verify loading/cleaning performance in use
- Check PPP label whether rinsing procedures are specified
- Integrated pressure washers must be capable of cleaning the discharged PPP container such that <0.1% of its rated capacity is retained
- Manual washing of discharged PPP containers must include a minimal triple rinse procedure with each rinsing added to prepared main tank solution

DO clean and safely manage seals and caps

- Do follow PPP label advice
- Check with waste contracting company for guidance on collection and disposal of seals and caps

  Guidelines offered may suggest:
- Place removed secondary [foil] seals of each batch of loaded PPP containers into a cleaned container, rinse and add rinsates to spray liquid in tank.
- Caps – of containers with secondary seals – must be replaced securely on its cleaned container
- Caps – of containers without secondary seals – must be placed into a cleaned container, rinsed and replaced securely on its container
- Store cleaned caps and secondary seals safely before collection by waste disposal company

DO seal and secure - partly used containers/packages immediately after use

- Replace seals securely immediately after use
- Partly used containers must be kept upright, stable and secure to avoid leaks, spills and unauthorised use
- Partly used containers must be replaced within outer packing

DO NOT leave sprayers unattended when they are being filled

- Always supervise the sprayer when being loaded with PPPs
- Be prepared to take emergency actions
- Keep unauthorised personnel away
- Always observe the filling tank and the security of the PPP to be loaded

Mixing & Loading

DO NOT leave prepared PPP solutions unattended or unsecured

- Sprayers being filled or containing undiluted/diluted PPPs must never be left unattended
- Prepared solutions should be used as soon as is possible
- Where unexpected short term delays occur then secure the work area and make equipment safe from unauthorised human access
- Special attention to stop unauthorised access to tanks content and operating valves must be taken
- Position the sprayer and its contents within a secured bunded area during any unexpected longer term delay

Main Process: During Spraying

TOPPS BMPs are intended to identify where PPPs [pesticides] may pose a risk to water by point source pollution routes and suggest how such risks may be mitigated. They are compiled from expert views throughout the EU and take into consideration any existing technical limitations. Their intention is not to overrule local legislation but to support and complement any national legislation or existing approved practices that may exist. These BMPs – by necessity – are a dynamic process so regular updating on current practices and legislative needs is recommended.

During the spraying process, operators must remain aware of the many issues that may demand pre-planned and unplanned attention. Areas not to be over-sprayed should be familiar to him but he must now know how to take the required appropriate avoidance. Sprayers can develop faults, weather cannot be as predicted or some other unexpected emergency may arise; all must be anticipated and remedial action taken.

Point source pollution may take place whilst spraying through a lack of good training and/or a poor understanding. Taking considerable care to not directly spray surface water and wells may be better recognised now but other, equally poor practices are not. For example, some PPP users prime their spray lines when static and – much worse – do it at the field edge and/or over a ditch; a practice that greatly increases the risks of point source pollution.

The drift of sprayed drops is greatly influenced by machine settings and use. Consider orchard and vineyard crops that are typically sprayed many times; a spray of drops are directed up and above the cropping canopy to form a drifting cloud that sediments into the immediately adjacent boundary zones. Many sequential low volume losses of drift can then compound into – for example - low flowing/stagnant surface water to cause high concentrations of pollutants. Techniques that direct spray only to the intended target structures will lessen the risk of point source pollution.

It is well recognised that Finer spray qualities increases drift losses but they also increase contamination levels on the outer surfaces of sprayers and tractors. These higher deposits may need more attention by the operator if they are to be effectively removed and to remember that, in the area of the field where the machines are cleaned, the resultant washed off PPP should not locally over dose that area or pose any risk for point source pollution.

This Main Process also makes operators aware of the risk of PPPs being lost from water logged, frozen or snow covered fields and that this form of loss – often called ‘run-off’ - may be lessened using appropriate measures such as contour ploughing or vegetated buffer strips. Horticulturalists also use the term ‘run-off’ to describe those spraying conditions that restricts the optimisation of retained PPP deposits by target leaves. Higher water volumes and coarser sprays - as well as higher drop impact speeds - may all reduce levels of retained PPP and cause their loss to the surrounding soil.

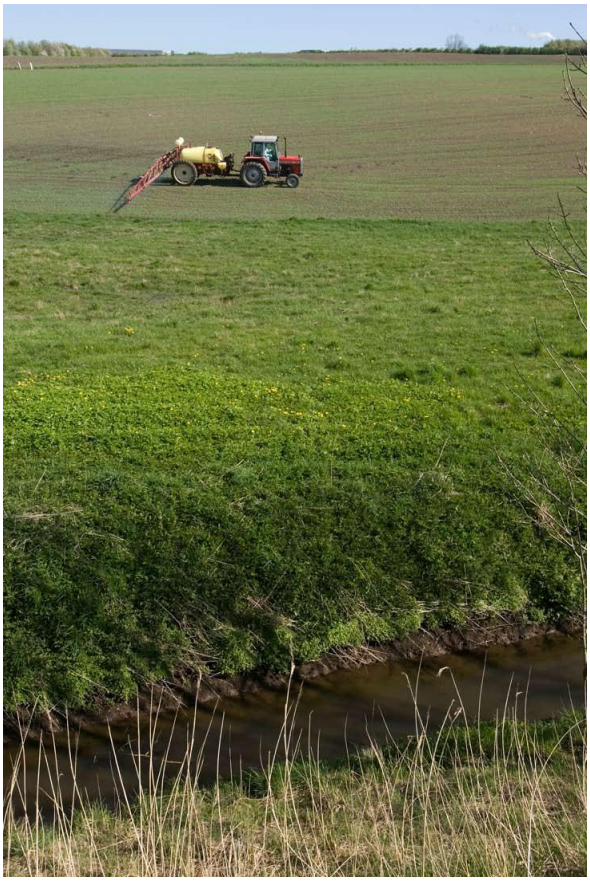
Finally, as the need to improve the efficiency of existing spraying practices becomes more evident so the industry responds. Whilst agronomists have encouraged ‘patch’ spraying and the use of ‘weed wipers’ so manufacturers of spraying equipment are introducing automated recognition systems that treat only the intended target. Mistblowers can now be adapted to identify the immediate presence of target tress/bushes/vines and their spray system to be activated on/off when they are detected; the resulting lessened PPP emissions within the treatment zone can now be linked to less water pollution.

Sub processes:

General: Comply with all good field spraying practices. Recognise and be prepared to adapt to changes that are needed to minimise the risk of point source pollution.

Emergencies: Be prepared, rehearsed and know how to deal with emergencies such as major leaks from sprayer.

Direct contamination: Choose and use those spraying practices that protect sensitive areas.



Drift and run off: Both are a risk to point source pollution and need to be recognised and avoidance actions taken.

DO NOT spray when sprayer is travelling at speeds below that for which it has been calibrated

- DO NOT emit spray when sprayer is stationary
- DO prime spray lines when sprayer is moving at calibrated speed
- DO consider use of spray booms that can re-circulate spray liquid

DO NOT emit PPP spray – unnecessarily – within the intended treatment zone

- Do consider the use of systems and/or changes in practices that spray only the intended target structure within the treatment zone.
- Adopt – where appropriate – 'patch' spraying practices in fields, tree/bush recognition systems and/or applicators that apply PPP only by contact with target surfaces

DO use spraying practices that ensure – where appropriate – uniform spray deposits over the intended treatment area

- Use field practices that minimise boom movements
- Ensure boom height is as required by manufacturer; typically 35 to 50 cm for fan nozzles above first intercepting foliage.
- Use boom section valves and/or turn-off individual nozzles to not over dose

DO NOT spray PPPs using application methods that do not effectively reach and/or retain the emitted spray by the intended target surfaces

- Use application methods advised for the PPP to be sprayed
- Avoid the use of higher water volumes and coarser spray drop sizes especially when spraying plant surfaces directly rather than within a crop canopy
- DO follow any guidance on nozzle to spray target distance
- DO NOT spray plant surfaces that are wet or whose conditions could risk gaining the intended effect
- DO note that target structures for the sprayed PPP may change – for example - as a consequence of leaf or canopy development

DO rectify/adjust any equipment problem at once

- Stop spraying and depressurise system
- Note field location
- Ensure sprayer is out of the immediately treated area and visually assess problem
- Avoid use of buffer zones and all environmentally sensitive areas, public rights of way
- Follow machinery manufacturers guidance
- Wear personal protective equipment and be prepared to contain PPP spills

DO have plans – and be prepared for – any emergency

- Ensure colleagues know where you are spraying and how long you are expected to be
- Do have mobile telephone with emergency contact numbers
- Do take care – especially when folding/unfolding wider booms - in the vicinity of overhead power cables
- Do be aware of the hazards when turning on inclined fields
- Do take special care with part loaded sprayers when turning, slowing down or speeding up
- Do not keep spraying in vicinity of or when being approached by members of the public.
- Take care when folding/unfolding booms in vicinity of public

Emergencies

DO NOT spray PPPs onto any area that may directly/indirectly cause point source pollution

- Take every action needed to protect buffer zones and all environmentally sensitive zones
- Spray headlands last and take particular care [or do not spray] when wind blows towards adjacent sensitive zones
- Do ensure every intended swath can be precisely treated
- Rectify problem such as leaking hose or blocked/dripping nozzles immediately

DO NOT over spray buffer zones or any environmentally sensitive areas, watercourses, wells, drains, springs, public rights of way and hard surfaces

- Check the sprayer is only directing spray at the intended target surfaces within the treatment area
- Adjust the spraying swath to match the required treatment width – especially areas adjacent to headlands
- DO turn off boom sections of sprayer and/or individual nozzles to avoid multiple applications or to minimise risk of PPP being deposited where it is not intended

Note: PPP approved for use in – for example – the aquatic environment will clearly state that special exemption is permitted on its label. These stated conditions of use must be followed precisely

DO NOT allow PPPs to be sprayed onto wells or their protective structures – or any drinking water sources, areas or systems – nor any adjacent ground

- DO enforce buffer zones and/or any non-spray areas around wells
- Apply the advised safe distances to protect any risk of PPP contaminating water
- PPP labels may specify safe distances
- DO use low drift spraying systems such as low drift nozzles whenever possible
- DO consider wind direction and strength when spraying in the vicinity of any drinking water source – and take further evasive action
- DO minimise all risks by – for example – not travelling close to such water sources DO NOT stop or leave any spraying equipment - or prime movers that have been used for that purpose – near any such water sources

DO NOT spray PPPs onto any surfaces where there is a risk of direct or indirect loss to any drainage system

- DO avoid the spraying of hard surfaces such as concrete or compacted earth that is in close proximity to any surface or hidden drainage system
- DO not spray water logged ground or that which is/may become saturated that is in close proximity to any surface or hidden drainage system

Run-off and Drift

ALWAYS minimise spray drift when spraying

- DO check local advice for maximum wind speeds that may be tolerated when spraying
- Do check PPP label for guidance on any specified drift reducing measures that must be used
- Do use the coarsest spray quality advised on PPP label
- DO use the highest water volumes and lowest nozzles pressures within PPP label advice if drop size/spray quality advise not stated
- DO keep spray boom heights at the minimum for that specified by manufacturer
- DO use lower spraying speeds
- DO consider not spraying the swath adjacent to any sensitive areas when wind is blowing towards them
- DO avoid those conditions such as high ambient temperatures that would cause PPP losses through thermal inversion or vapour drift

Main Process: After Spraying

TOPPS BMPs are intended to identify where PPPs [pesticides] may pose a risk to water by point source pollution routes and suggest how such risks may be mitigated. They are compiled from expert views throughout the EU and take into consideration any existing technical limitations. Their intention is not to overrule local legislation but to support and complement any national legislation or existing approved practices that may exist. These BMPs – by necessity – are a dynamic process so regular updating on current practices and legislative needs is recommended.

Ensuring the continued safety of sprayers that have applied PPPs – and recording their prior use - has many facets. For example, internal cleaning may be vital to protect the next crop to be sprayed, external cleaning avoids PPP – as a contaminant on external machinery surfaces – and safe storage will protect the sprayer from unauthorised people and any damage it could do to the environment. Record keeping is also increasingly crucial as farming activities – together with all industries – becomes more accountable.

The rapid recent increase in the importance of all these 'After Spraying' activities has prompted many developments to ease the workload of operators; activities that – in the past - have been wrongly perceived as being non-productive and of limited value. Today's sprayers are now very likely to be fitted with dedicated systems that encourages the cleaning of these machines in their last field of use; a measure that is much encouraged for it confines all the PPP to its 'Approved' zone with minimal waste and risks. Earlier cleaning systems involved quite complicated routines that ensure the operators follows the right sequence of cleaning but these, too, are being replaced with automated and/or simpler programs. Similarly, traditional worksheets with written records are being superseded with electronic devices that are linked to the farms computer to note all the relevant information on PPP use. Available and categorised information – in the field – is without apparent limits and its selective use can do much to keep the operator constantly alerted to what needs to be done and noted. Compliance with crop assurance schemes and similar validating activities [traceability] has also done much to improve information flow from producer to consumer with PPP inputs remaining a vital issue.

Sub processes:
Cleaning sprayers: The internal and external cleaning of spray equipment - in the field or on the farm - are activities that must be made and must be done correctly if the risk of point source pollution is to be minimised. Operators may need to manage PPP solutions that are surplus to their immediate needs and know where, when and how to clean sprayers effectively and safely. Regulatory Bodies increasingly encourage the cleaning of all equipment used with PPP immediately after its last use in the field just treated; a practice that reduces the chance of contaminated machines or their contents from being a risk in other areas or to the public.

Storage and maintenance: Sprayers are one of the most extensively and intensively used pieces of equipment on the modern farm. Equipment costs, reliance, use, complexity and size have all increased. Their sustained, safe, reliable and cost-effective use is critical if they are to meet all demands; maintenance and storage must be adequate.

Records: Keeping full records of all spraying activities is an essential requirement that is needed to satisfy a wide range of interests; from those who may purchase the crop to those responsible for water purity. The justified and fully accounted use of PPPs are critical to the success of the modern farm.

DO use excess/surplus prepared PPP solutions in an approved manner

- Check PPP label for specified instructions
- Diluted PPP solutions may be applied within its last field of use on condition that the total dose does not exceed the permitted maximum and that this later application does not affect the efficacy or safety of that product
- Unsprayed areas - that have been earlier identified within the treated field – can be used to support activities such as the spraying of small excess volumes and sprayer cleaning
- Do not use any 'full dose' sprayed area for any further treatments and always ensure the Approved dose is not exceeded.
- Care must also be taken when re-spraying under-dosed areas to not lessen efficacy or safety of any earlier application
- Follow label guidance on the management of larger volumes of surplus prepared PPP solutions
- Some PPP solutions may be safely retained overnight in the sprayer when there are no nozzle or filter clogging risks, no sedimentation or other concerns
- Equipment containing surplus spray solution must be stored in a safe and protected environment
- Some excess prepared PPP solutions may be retained for a defined maximum time in labelled, secured containers whose use are dedicated to one crop on that farm

DO NOT drain or permit spray liquid to be discharged to ground

- Do not drain excess PPP solutions from tank sumps or other traps to ground
- Do not allow any excess PPP solution to locally saturate soil to cause over dosing or risk run-off
- Only empty sumps, hoses and other liquid traps when the discharged solution can be safely retained for safe disposal such as within a bunded area

Never clean a sprayer – or its prime mover – near surface water or any area that could directly or indirectly be at risk from PPP contamination

- Only use areas for cleaning sprayers that have been pre-planned and risk assessed
- Never clean a sprayer – or its prime mover – in any manner that would risk PPP losses out of its planned cleaning area
- PPPs must not – directly or indirectly – be allowed to reach areas for which that product is not approved
- PPPs must not reach any area at localised dose rates that exceed its permitted maximum

DO clean sprayers – and their prime movers

- Do clean sprayers internally to reduce risk of subsequent crop damage, residue fears and/or crop tainting
- Do clean sprayers externally to minimise risk of PPP point source pollution
- Do clean sprayers to increase machine reliability, longevity and safety to operators, those making repairs/adjustments, bystanders and the environment
- Do clean sprayers over an untreated area in last field of use – as instructed - using the sprayers integrated cleaning facilities
- Sprayers without integrated cleaning facilities must be safely transported - such that no external or internal PPP losses occur and without risk of contamination to people or the environment – to a bunded area, biobed or other approved site to be cleaned as advised
- Do follow instructions for the sprayer and on PPP label for when and how to clean. Note any specific recommendations for detergents, deactivators or other products
- Do multi-rinse [at least three clean water rinsing cycles are normally required] and/or as advised to clean all internal surfaces contacted with PPPs
- Do use clean water pressure washing with jets and/or brush attachments as advised
- Do note that external surfaces of booms may be more effectively cleaned when unfolded and in low position
- Do avoid pressure washing practices that may remove and propel PPP deposits beyond catchment area

DO use clean water effectively, safely and in limited volumes

- Ensure you do not cause run-off, localised over dosing in the field or produce excessive quantities – to be later safely disposed - in bunded areas
- Avoid use of high water volumes that may saturate the work environment in field or farm

DO store sprayer secure and safe at specified location

- Sprayers not being used must be securely located and not present hazards to humans, animals or the environment
- Do store cleaned sprayers securely, under cover, protected from frost damage, away from humans and food supplies
- Sprayers stored without cover must be positioned on hardened bunded surfaces that are located within a secured area
- Any precipitation that has contacted sprayers stored – without cover - at mixing/loading sites must be collected and treated

DO ensure sprayer is well maintained and safe for repairs

- Do maintain sprayers regularly and/or as advised such that planned work can be done under safe conditions and field problems are minimised
- If possible, undiluted or diluted PPP should not be retained within sprayer before making any repairs or maintenance activities
- Do note that some components such as main filters may be capable of removal for cleaning without draining main tank
- Activities such as pump overhaul that risk loss of PPP must be done over bunded area or one that will trap and retain liquid
- Do note that internal repairs of tanks is a specialist task often done under supervision and with forced clean air supplies

DO keep adequate records of all PPP applications see page 50)

- Do record the PPP used, its dose and the way it was applied; water volume, spraying speed, pressure, nozzle type, sprayer
- Do record location of treatment zone and its reference name/number, crop [cultivar, stage and condition], target pest/weed/fungus.
- Do record date and time of treatment, weather and soil conditions as well as any difficulties encountered

PPP Application Record

Operators Name:
Date:
Job Reference:

Site Treated: Field and farm name, map reference:

Crop: Cultivar/variety, growth stage, condition

Reasons for treatment:

Sprayer; make, boom size:

PPP used (MAPP or HSE number):
Dose:

Water volume:
Spraying speed:
Nozzle type, size and pressure:

Total PPP used ;
Total area treated

Weather conditions: soil conditions, temperature, wind speed and direction, rain, frost

Start time:
Finish time:
Total hours:

Warning signs: displayed/removed

Neighbours warned: beekeepers, others

Exclusion period: No re-entry and/or harvest interval

LERAP compliance:

Crop Assurance schemes:

Proximity of water courses:
loading and mixing **spraying** **cleaning**

Difficulties/problems: PPP, equipment, other

Main Process: Remnant Management

TOPPS BMPs are intended to identify where PPPs [pesticides] may pose a risk to water by point source pollution routes and suggest how such risks may be mitigated. They are compiled from expert views throughout the EU and take into consideration any existing technical limitations. Their intention is not to overrule local legislation but to support and complement any national legislation or existing approved practices that may exist. These BMPs – by necessity – are a dynamic process so regular updating on current practices and legislative needs is recommended.

Waste from every industry - including agriculture - is extensively regulated by the EU, its Member States (MS) and/or at regional level. 'Reduce/Reuse/Recycle' is often quoted and applies equally to PPP users. Do note that further general principles apply to all waste that – in this context - is defined as a side product linked to a production process that cannot be recycled, used or re-used. These general principles are:

Precautions must be taken to minimise waste

The polluter pays for any damage caused from waste

No environment must be put at risk when handling and disposing of waste.

TOPPS BMPs therefore describe methods for managing the disposal of remnants and packaging to avoid them becoming waste. The importance of this topic is such that earlier Main Process's also refer to the need to minimise waste and so – this final stage in the use of PPPs on the farm – may repeat these earlier statements and specifications. One critical means of minimising waste is to reuse– where possible – those small quantities that are generated. For example, surplus prepared spray liquid – which may have been further diluted during a cleaning process – should be disposed by spraying over an area for which that PPP has been Approved; a practice that is not only permitted but encouraged as long as specified conditions are met. Systems for managing used PPP containers and packaging are now much more common and well accepted by farmers and growers. Cleaned containers – shredded or not by the user – are collected by the recycling company that sometimes may offer separate facilities for dealing with the caps and foil seals. PPPs that will not - or cannot - be used demand special attention. Most PPP distributors are prepared to accept back those recently purchased products that are not going to be used or are no longer Approved for the intended purpose. In every situation, do avoid storing any waste for any undue time; it is a risk to all including that for point source pollution. The need to manage waste PPP has also prompted the development of many systems for use on farms. Some of these offer physico- chemical abstraction methods – others bio-remediation, reverse osmosis, phytocatalysis or electrolytic breakdown. In some instances, these methods generate a disposable liquid and / or solid fraction that may be more concentrated then the solution being processed. The manufacturers/installers of these systems will advise whether this final waste is reusable or must be treated as hazardous to, thereby, require specialist disposal methods. Depending on systems used, environmental legislation and source of waste, either solid or liquid waste fractions could be considered for use as a raw material on the farm. Critically, this secondary use, must never introduce any risks and, if it does, then must be treated as hazardous waste.

Sub processes:
Prevention: Minimise waste at every stage of PPP use. Consider not preparing the full calculated quantity of spray solution for the intended treatment zone so that an untreated appropriately sized area can be over sprayed with the internal washing solutions during the sprayer cleaning process.
Surplus or obsolete PPP: Only order Approved PPPs in quantities that are adequate for their foreseen use. Routinely check PPPs in store. Return to supplier or authorised disposal agent any surplus and/or obsolete stock in original packaging.
Container disposal (single trip or reusable): Most containers and packaging are currently single trip. These must be cleaned and collected by an authorised waste collection company who may demand that caps and foil seals, for example, are segregated and may or may not accept chipped containers. Reusable containers – that often remain the property of the company supplying the PPP - have specific guidance with them on their collection and re-use that must be followed.

Diluted liquid waste disposal: Coping with diluted PPPs of imprecise or unknown concentration
Solid waste disposal: Management of solid wastes derived from the treatment of spills and/or processing diluted solutions.

DO respect and fulfil changing regulatory requirements for PPP use

- Do check with PPP manufacturer and/or supplier for advise if purchased products conditions of use are changed
- Changing regulatory conditions will decide whether PPPs may have to be returned to supplier or may be permitted for limited, short term use
- Where permitted, ensure PPPs – subjected to a withdrawal procedure - are preferentially included, for their intended Approved use, in your spraying programmes

DO prevent the production of remnants and waste from PPP use

- Pre-plan and organise all spraying activities
- Only order and store those PPPs for their carefully predicted use
- Only use Approved mixes of PPPs
- Use data from calibration, label and intended treatment area to calculate total amount of PPP and water needed
- Do not plan nor prepare any surplus PPP spray solutions
- Do keep an unsprayed area within treatment zone for activities such as sprayer cleaning
- Do use a sprayer that holds back minimal volumes of non-sprayable PPP solution
- Do use – wherever possible - any remaining prepared PPP solutions in its Approved manner
- Do clean sprayers internally and externally - regularly and effectively
- Do recycle cleaned containers, their closures and packaging as approved

Do implement instructions on PPP label for disposal of packaging and contents

- The Approved disposal methods for PPP containers and packaging must be followed
- Do check PPP label and note that their requirements may vary between the EU Member States and be changed as a consequence of time delays between label approval and the products use
- Do retain PPPs – diluted and/or undiluted – in secure, labelled containers above ground level within a bunded area

Do dispose containers, closures and packaging safely

- Use reputable container collection scheme
- Collect secondary seals in sealable bag for separate collection and disposal
- Some collection schemes insist that closure caps are also collected separately

Do not dispose any PPP or their containers/packaging by unauthorised means

- NEVER burn or bury PPP, their containers and/or packaging
- Never discharge PPPs in sinks, drains or any other system that may directly and/or indirectly pollute ground and/or surface water
- Never allow the discharge of PPPs to - or within - any land other than that fulfilling its Approved Conditions of Use
- Never allow the discharge of PPPs such that they can cause any pollution of ground and/or surface water

Do store safely, surplus PPPs that will not be used and are awaiting collection

- PPPs - which will not be used – must be stored safely in an identified, secured and sheltered designated area
- Storing PPPs - which will not be used – may be subjected to specific local legislation and these needs must be met
- Use of PPP stores to retain PPPs which will not be used may be permitted but: that area must be designated, containers must be clearly labelled and do note any time and quantity restraints

DO safely dispose surplus/unwanted /unneeded/unusable PPPs

- Do arrange for its earliest collection by its supplier or authorised waste disposal contractor. Environment Agencies may require consignment note and payment fee
- PPP awaiting their collection for return must be in their original containers and packaging with intact labels
- When your foreseen needs for a specific PPP have changed, consider whether these products can be used in their approved manner by farmers/growers known to you

DO safely collect and transfer any water used to remove and dilute spilt/splashed PPP from bunded sites to storage tank for safe retention

- Drains, pipes used to move the retained spills, splashes and other losses of PPP to storage tank from bunded areas such as those used for stores and mixing/loading must be secure and not leak nor trap liquids
- Tanks or containers used to retain diluted PPP solutions from the removal of spills and splashes must be appropriately labelled on designated site with records of its contents kept
- Tanks used to retain PPPs below ground level need be double walled

Do safely dispose very low concentrations of *unknown* PPP solutions

- PPP solutions such as those originating from the PPP store or mixing/loading area may be of unspecified content and concentrations but must be safely disposed
- Treat low concentrations of PPP solutions using recognised physical/chemical systems or retain for collection by authorised waste disposal contractor

Do safely dispose very low concentrations of *known* PPP solutions

- Specified means may permit the disposal of low concentrations of approved, known PPP solutions.
  - DO comply with relevant Landfill Regulations that may permit the disposal of diluted agricultural PPPs (no more than once at any one site in any year) onto soil or grass
  - Other means may permit the addition of this PPP solution for use:
    - In drip irrigation of fertiliser or herbicide
    - As part of the diluting water used in pre-cropping herbicide applications
    - Within slurry that is spread on farms own land.
- Disposal of minor PPP spills by slurry tank is the land owner's liability and must be done such that the PPPs final dilution will not cause any biological effect nor raise any residual risks
- Conditions not permitted may include
  - Use of land prone to flooding [no more than once every 10 years]
  - Water extraction areas such as near wells, springs
  - Land that slopes towards surface water or is at risk of erosion
  - Any increase in risk of unwanted biological effects or to the environment

Do safely dispose dry/solid PPP containing waste

- Dry/solid wastes from cleaning up spills with absorbent material or from processing PPP containing liquids must be managed safely
- Do note that processing diluted PPP liquids by separation technology - such as physico-chemical and/or filtering processes, incomplete mineralisation - may reduce volumes but increase PPP concentration
- Biodegradable fractions such as sawdust used to absorb spills or organic components arising from bio purification systems can be further contained to ensure full microbial breakdown
- Non-biodegradable fractions such as sand used to absorb spills must be collected by authorised waste disposal and recycling contractors

Do recycle solid disposable fractions after treatment

- Solid disposable fractions may be reduced or recycled following bio-degradation if legally supported
- Bio-degradation should be conducted under cover in a bunded area and not present new or additional risks
- Recycling is not allowed in case of accident or emergencies affecting the bio-degradation process including oil spillage.

Do treat non-biodegraded or recycled solid fractions as hazardous waste

- Seek local advice for authorised waste reception to waste site or incineration for energy recovery

IV. TOPPS co-ordination and activities between MS

The TOPPS Project is organised in four geographical clusters of EU Member States

Nordic: Denmark, Sweden and Finland
East: Poland, Czech Republic, Slovakia and Hungary
South: Italy, South France, Spain and Portugal
Mid West: Belgium, United Kingdom, Netherlands, North France and Germany

Project development

The TOPPS project started on November 2005 and will end October 2008. It is structured to follow a sequence of logical steps.

a) Inventory /Status analysis [What is already known and by whom?]
Partners collected and analysed all relevant studies and available publications to better understand the challenges related to the contamination of water by plant protection products through point sources.
In addition, the addresses of organisations and persons representing the key stakeholders in the various countries were collected to build a basis for networking and dissemination of results.
Materials and addresses are documented on a web based database, which also provides networking capabilities to encourage cooperation across country borders.(www.TOPPS-life.org)

b) The Data Base supporting these Best Management Practices
All practices involving the use of PPPs on farms and orchards within the EU were collected by participating Member States using an agreed electronic editing format. Information was derived from legislation, Codes of Practice, cropping schemes and similarly recognised and/pr approved data bases. This large compilation was then structured into the sequence of events that operators are likely to follow when using these products on their farms and orchards. EU experts then identified and graded those practices that could most influence the risk of point source pollution and used all existing knowledge and expertise to suggest how best to mitigate that risk. It is recognised by all who contributed to these TOPPS BMPs that today's knowledge and practices are rapidly advancing; a beneficial activity that will prompt the need for these practices to be regularly upgraded.

c) Publicising and take-up of Best Management Practices (BMPs) [How will TOPPS inform operators?]
These agreed BMPs will be used as the basis for all publications, trainings, workshops and presentations. This material will create awareness and give recommendations to operators on how to avoid contamination of water. Publicity at those big events attended especially by arable farmers and operators will further heighten all TOPPS activities.

Critical to the success of TOPPS, will be recognition by water authorities that TOPPS BMPs actually prompt less PPP pollution. Ten Model farms will be used by

participating countries to demonstrate those better practices that have led to reduced water contamination from point sources. Harper Adams farm in Shropshire has been chosen for this purpose being particularly well suited for the UK as it is located in a mixed farming area, growing a diverse range of crops in a region with higher rainfall.

Six water catchment areas will initially pilot the transfer of the advice within the BMPs to operators in those regions using intensive support and information campaigns. These regions are to be audited at the beginning of the project and at the end. The audits will focus on the three main dimensions of TOPPS

- Awareness and Behaviour
- Technique
- Infrastructure

d) Proposed scaling up
At the end of the TOPPS project in 2008, the accumulated materials and experience will be used to make a proposal on how to achieve a sustainable approach for reduced point source pollution across all Member States in the EU.

Stakeholder interaction

These TOPPS BMPs were prepared having ensured the critical involvement of a large group of stakeholders. Key stages were:

- Agreement of the 'Ways and Means' (Oct 2006)
- Discussion of these TOPPS proposal with stakeholders at a national level (National Forums - October 2006 to end 2007)
- Extended Steering Committee with European Stakeholders Nov 2006
- European Stakeholder Workshop Feb 2007

After each discussion step, all relevant suggestions were adapted in a commonly agreed format.

V. Training of PPP users

UK requirements as quoted by DEFRA Code of practice for using plant protection products [PPPs]:

By law, everyone who uses pesticides professionally must have received adequate training in using pesticides safely and be skilled in the job they are carrying out. This applies to:
Users, operators and technicians (including contractors)
Managers
Employers
Self-employed people and
People who give instruction to others on how to use pesticides.

By law, you will (there are certain exclusions) need to obtain a 'certificate of competence' relating to the type of equipment used to apply the pesticide.

Basic training needs to include a good understanding of:

Relevant Laws	*Risks associated with PPP use*
Safe working practices	*Emergency action*
Health monitoring	*Record keeping*
Using equipment for applying PPPs	

Training activities in UK colleges and organisations

Today's needs for the training of users and those responsible for the application of PPPs involves many inter-dependent disciplines. Biologists and agronomists at establishments such as Harper Adams, emphasise the relationship between the method and manner by which the application equipment is selected, adjusted and used to apply these products as being crucial to their subsequent efficacy and selectivity. However, in the last decade, application advances have been prompted by the need to improve safety to operators, bystanders, the work area and the wider environment; advances that have demanded engineering solutions.
For example, research and courses at Harper Adams have spearheaded drift reducing technologies, better PPP loading methods and now, through TOPPS, the need to understand and reduce the risk of point source pollution.
Harper Adams engages agronomists; biologists and engineers to ensure every aspect of safe pesticide use can be understood and practiced by its delegates. Some courses lead to recognised post-graduate university qualifications such as its MSc in Crop Protection whilst others meet specific industry needs such as BASIS; a course that ensures anyone responsible for the professional sales and promotion of PPP is competent in their use. Operators, too, have the opportunity to attend the FEPA 'family' of courses run by Harper Adams and many other local colleges and organisations – for those who may actually apply or directly supervise – the application of PPP itself. All courses rightly emphasise that engineering related developments have become crucial to the continued and sustainable use of PPPs.
More information: **www.harper-adams.ac.uk**

Information on training and certificates of competence

Guidance on your training needs, certificates of competence and your continuing professional development is available from:

Lantra Awards at
National Agricultural Centre
Stoneleigh
Kenilworth
Warwickshire
CV8
Phone: 024 76696996 (Sector Skills Council)
024 76419703 (Lantra Awards)
Web: www.lantra.org.uk

NPTC [formerly the National Proficiency Tests Council] at
National Agricultural Centre
Stoneleigh
Kenilworth
Warwickshire
CV8 2LG
Phone: 024 7685 7300
Web: www.nptc.org.uk

Continuing Professional Development [CPD]

NRoSO Membership of the (National Register of Sprayer Operators) will help validate your competence with PPPs and is also a valuable source of information.
Phone: 024 76857300
Web: www.nroso.co.uk

NSTS (National Sprayer Testing Scheme) sprayer testing offers operators an independent assessment of their sprayers function and potential accuracy.
Phone: 01733 371381
Web: www.nsts.org.uk

BASIS Registration offers qualifications for those selling and advising on the use of PPP's as well as other aspects of the agricultural environment.
Phone: 01335 343945
Web: www.basis-reg.com

VI. Web based information sources

TOPPS web site:	**www.topps.org**
Biobeds	www.biobeds.info
Code of Practices:	www.pesticides.gov.uk
Crop Protection Association	www.cropprotection.org.uk
HSE:	www.hse.gov.uk/pesticides
[Out of hours, human health issues phone 0151 922 9235]	
EA: England and Wales	www.environment-agency.gov.uk
Scotland:	www.sepa.org.uk
Lantra awards	www.lantra.org.uk
National Register of Sprayer Operators	www.nroso.org.uk
National Sprayer Testing Scheme	www.nsts.org.uk
National Proficiency Test Council	www.nptc.org.uk
Pesticides Safety Directorate (PSD)	www.pesticides.gov.uk
Waste/remnant disposal	www.wasterecycling.org.uk
Voluntary Initiative	www.voluntaryinitiative,org.uk

Further useful contacts:

ADAS Environmental	
Agricultural Engineering Association	www.aea.com.uk
Agricultural Waste Plastic	www.agwasteplastics.org
Association of Independent Crop Consultants	www.aicc.org.uk
BASIS Registration	www.basis-reg.com
British Crop Production Council	www.bcpc.org
BCPC for books on sprayers/spraying	www.bcpc.org/bookshop
British Pest Control Association	www.bpca.org.uk
Chartered Institute of Waste Management	www.ciwm.co.uk
Environment Agency	www.environment-agency.gov.uk
[Emergencies: Phone 0800 80 70 60]	
Licensed waste (eg obsolete PPPS) contractors	www.esauk.org
Linking Environment and Farming (LEAF)	www.leafuk.org
National Association of Agricultural Contractors	www.naac.co.uk
National Farmers Union	www.nfu.org.uk
Natural England	www.naturalengland.org.uk
Scottish Agricultural College (SAC)	www.sac.ac.uk
Transporting dangerous goods	www.dft.gov.uk
Water UK	www.water.org.uk

VII Glossary

Terms used with PPPs [pesticides] and in these TOPPS BMPs (in blue)

A

Active ingredient (sometimes called Active substance): The part of a formulated PPP, or a substance or micro-organism (including a virus) that gives it pesticidal properties with general or specific action against harmful organisms, plants, parts of plants or plant products.
Additives (or Adjuvant): Products – without inherent active ingredient(s) properties - added to the spray solution to increase PPP activity, safety and/or reliability.
ADR: A European Agreement for 'Introduction to the Carriage of Dangerous Goods by Road' that is relevant to those transporting PPPs
Aerial application: Applying a pesticide from an aircraft (either fixed-wing or helicopter) in flight.
Air assistance: Using forced air to carry spray droplets to their intended target (see 'Broadcast air-assisted spraying' and 'Downward placement air-assisted spraying'
Air-inclusion (air-induction) nozzle: A nozzle that induces (draws in) air by a venturi to be mixed with spray liquid prior to leaving its orifice and be typically used to produce a spray of low drift, coarsely, sized drops.
Agricultural vehicle: Agricultural or forestry tractor or agricultural machinery
Agricultural or forestry tractor: Motor vehicle and its trailer which is constructed or adapted for use off-road for the purpose of agriculture and which is primarily used for that purpose (not a dual purpose vehicle).
Agricultural machinery: Any mobile machinery which is constructed or adapted for use off-road for the primary purpose of agriculture.
Aphidicide: An insecticide limited to the control of aphids.
Application: The process of generating and directing prepared PPPs at the intended target surfaces within a treatment zone.
Application rate: The amount [in volume/weight/mass] of a PPP or other material that is applied over a defined area. Units used are typically litres/hectare or Kg/hectare.

Volume application rate (VAR) is the total (usually diluted) volume of PPP solution applied over a defined area.

Dose rates are usually expressed as the Application rate for the amount of active ingredient applied whilst Product application rate is the amount of formulated product applied over a defined area.

Application volume: See 'Water volume'. The volume of diluent (usually water) into and/or with which the PPP(s) is dispersed.
Approval/Approved: PPPs must be approved before they can be advertised, stored, sold, supplied or used. An approval (normally applied for by a company wanting to market a PPP) will only be given when all the required evidence and information on the safety, effectiveness, and (where relevant) the humaneness of the PPP have been submitted, evaluated and considered acceptable.
Approved mixes: Prepared spray solutions that contain more than one Approved PPP that are independently verified and listed for use.
Atomisation: Production of sprays from liquids.

B

Band spraying: The application of PPP between - or only to - crop rows
Beneficial occupier: Person responsible for the day-to-day management of the land
Best Management Practices: Workplace activities that have been defined as being the most appropriate for safety and efficiency
Biobed (lined biobed): A lined pit 1 to 1.3 m deep filled with a mixture of straw, soil and peat-free compost, and turfed over. When correctly operated, biobeds are effective at locking up and degrading PPP remnants resulting from drips and splashes during sprayer filling operations. In certain circumstances, a lined biobed may also be used for the disposal of diluted PPPs from tank washings.
Biodegradable: Capable of being decomposed by bacteria or other biological means
Biological monitoring: The measurement and assessment of levels of chemicals or their metabolites (substances the body converts the chemical into) in the breath, urine or blood (or any combination of these) of exposed workers.
Boom sprayer or Ground crop sprayer: Also called Field or Arable Sprayers. Equipment that can transport and disperse PPPs – that are usually prepared, diluted with water and pressurised through an array of nozzles - using a linear structure (the boom) that is conveyed above and over the area to be treated such that the product could be uniformly dispersed - or adjusted - to meet specific needs

Broadcast air-assisted spraying: Using equipment such as axial fan mistblowers that disperses - outwards and upwards - spray droplets, by means of forced, uncontained air streams.
Buffer Zone: Unsprayed land – normally a strip - immediately adjacent to an environmentally sensitive zone. The width of these zones may be varied to minimise the risk of any drifting PPP contaminating the protected area (See LERAP). Plants such as trees, elephant grass are sometimes grown in Buffer Zones to further decrease pollution of sensitive areas such as surface water
Bunds/bunded areas: An area or system capable of retaining spills and leaks that can be safely contained and drained or emptied into a holding or sprayer tank for safe disposal
Bystander: Any person who is present in (or near) the area where a PPP is being (or has been) applied who is not directly involved in using the PPP
Biological Control: The control of pests, through the introduction or encouragement of predators. This system may not normally use PPPs.

C

Calibration: The preparation, adjustment and checking of a sprayer to apply a PPP in a prescribed manner. Dose, water volumes and spray quality are key requirements that are mainly ensured by adjustments to nozzle emission rates and spraying speed. Contrasting application requirements usually demand use of differing nozzle sizes and types.
Catchment: The area of land from which water flows (by run-off, movement through the soil or drainage) to surface water or groundwater.
CE – mark: Conformité Européenne, European Conformity refers to the safety of the product indicating that it complies with essential mandatory European Health & Safety requirements. It does not refer to quality standards.
Codes of Practice: Code of practice for using Plant Protection Products. In UK the relevant Code of Practice is issued by the Pesticide Safety Directorate
Combustion products: Substances produced when a material is burnt (which may include harmful fumes and particles).
Clean water tank: see Tanks on sprayer; Rinsing and Hand wash tanks
Closed-transfer system: A means of transferring PPP from its container to the application equipment within a closed system that reduces the likelihood of operator exposure and environmental contamination.
Commercial service: The use of a PPP by a person - to crops, land, produce, materials, buildings or the contents of buildings – not in the beneficial ownership or occupation of that person or that persons' employer
Commodity substance: Compounds with an approved pesticidal use which have a variety of alternative non-pesticidal uses. Approval is given only for the use of the substance (not sale, supply, storage or advertisement) and there is no approval holder or approved pesticide product label. Users of a commodity substance under the terms of a commodity substance approval must read, understand and follow the approved conditions of use set out in the approval (which can be viewed on the PSD website).
Conditions of Use: Label statements on PPP containers that define those uses and procedures that are Approved and need be implemented. Non-compliance by the user (operator) may risk breaking warranty conditions
Cone nozzle: Full or Hollow coned types are produced. Commonly used on mistblower and knapsack sprayers to produce large volumes of very fine sprays. Pressurised spray solution is swirled inside the nozzle body to be emitted as a conically shaped liquid sheet that disintegrates into drops.
Consent: The detailed rules under Part III of FEPA are set out in what are known as 'consents' to be found in the schedules to COP(A)R and BCR (see Annex A). These consents are issued by Ministers and permit pesticides to be advertised, sold, stored, supplied and used, subject to certain conditions. These conditions set out general obligations for all pesticide users. (The term 'consent' is also used in the Water Resources Act to describe a consent to discharge effluent to surface or groundwater).
Contact pesticide: PPP that has an effect on a pest or plant tissue with which it has contact on its surface.
Contour ploughing: Soil cultivations at a continuous lands height
COSHH: Control of Substances Hazardous to Health
Crop Assurance schemes: Crop production practices that need be implemented as a condition of that products purchase
Crop Protection Management Plans: Provide structured approaches to safe, efficient and effective strategies – including the environmental assessment process - used and recorded during the production of that crop. Often recommended or required by Crop or Farm Assurance schemes

Crop selectivity: Herbicides used to control weeds within a crop need selective activity between plant species The basis for selectivity may be inherent within the PPP's active ingredient and/or its formulation and/or the application method.

D

Deactivators: Products that can change or influence the chemical structure of an active ingredient to lose and/or suppress its original properties

Dead volume: Residual volume of liquid within a sprayer that can not be pumped or circulated. Also termed 'Residual or Undilutable Volume.

Deflector (flooding, anvil, impact) nozzle: Sometimes called Flood, Impact or Anvil nozzles. A hydraulic or twin fluid nozzle commonly used on knapsack sprayers to gain wide dispersion patterns, to minimise nozzle blocking problems whilst producing relatively large drops at low pressures.

Detergents: Surface active agents usually used as cleaning agents

Diffuse losses: 'Diffuse Pollution' is mainly related to losses from treated fields due to runoff, leaching and discharge through drainage. Diffuse sources are influenced to a large extent by factors such as field topography, soil and extreme weather conditions soon after the applications as well as the physico-chemical properties of the pesticide itself.. In contrast, **Point Source Pollution**, is mainly related to inappropriate handling of the PPP during transport, storage, filling, cleaning, management of remnants and empty packages disposal. In contrast,

Diffusion: Random chemical and/or physical movement of, for example, a PPP within soil

Direct contamination: PPP that has been applied as directed spray – or in some other way - to a protected/sensitive area or surface

Dipping: Immersing material to be treated (completely or partly) into PPP solution

Dosimetry or exposure monitoring: The use of personal sampling equipment (and sometimes static samplers) to measure the levels of exposure to a substance (through skin contact or breathing it in) for operators when carrying out their normal work tasks. If the substance being used has been assigned a MEL or OES, the periodic or continuous sampling of the workplace atmosphere (usually in the operator's breathing zone) will establish whether the necessary standards are being achieved.

Drift (off-target drift): The movement of a pesticide (which may be applied as a spray, a fine granule or in another form) outside the target area due to air currents.

Dose: See Application rate. The amount [in volume/weight/mass] of a PPP or other material that is applied over a defined area. Units used are typically litres/hectare or Kg/hectare.

Downward placement air-assisted spraying: The use of a forced air stream to aid the downward movement of the pesticide to assist, for example, in penetrating a crop canopy or reduce off-target drift.

Directed spray: Spray that reaches and is retained by the intended target surfaces within the treated zone

DIX : Drift Potential Index used by regulators and on PPP labels to classify drift risk. Developed by JKI (formerly BBA), Germany.

E

ECPA: European Crop Protection Association

EEA: European Economic Area

Emulsion: A PPP, usually formulated in a solvent with an emulsifier that, when diluted in water, is dissipated to form very small spheres of its active ingredient dispersed in that water.

Economic threshold: Level at which pest levels [and damage caused or likely to be caused] determine that a spraying operation is economically justified.

End nozzles: Nozzles fitted to boom sprayers that limit directed spray to its calibrated width only

Engineering control (of exposure): Equipment or systems designed to prevent or control exposure of the operator (or environmental contamination) when handling and using pesticides. Induction bowls, remote control systems are examples.

Environment Agency/ EA: Independent organisation that advises and acts for the Government with responsibilities for monitoring the environment, investigating and prosecuting offenders.

Environmental Information Sheets/EIS: Available from some PPP manufacturers, suppliers and the VI website to provide 'user-friendly' information on the environmental impact of PPPs

EU: European Union

EU Directive: A EU Directive establishes laws, regulations and administrative provisions for compliance by all its Member States.

EQS: Environmental Quality Standards for PPPs - as pollutants - in surface water are a response to the needs of the Water Framework Directive.

F

Flat fan nozzle: Commonly used on boom sprayers. Spray solution is forced under pressure through an orifice that both controls that flow and shapes it into a flat sheet of liquid that disintegrates into drops.

Fog: A space treatment using a droplet size with a volume median diameter of less than 50 µm, and with more than 10% by volume smaller than 30 µm. This includes both thermal fogs produced in a very hot air flow and cold fogs produced by a vortex of air.

Following crop: The crop subsequently grown in the treated area, including subsequent crops from treated perennial species.

Formulation: The physical structure and chemical composition of a PPP as prepared for practical use by its manufacturer.

Fumigation: An operation in which the PPP acts as a gas (although it may not be applied in the form of a gas) to control or kill pests or other undesirable organisms.

G

GAP: Good Agricultural Practices define those farm practices that protect the consumer and environment

Granule applicator: Any broadcast or placement equipment (possibly air-assisted) which applies PPPs typically as a dry granule.

Ground crop sprayer: Any equipment of the spray boom type that applies pesticides using a boom operating in a horizontal plane.

Groundwater: All water that is below the surface of the ground in the saturation zone and in direct contact with the ground or subsoil.

H

Hand-held applicator: Any equipment carried by a person or where the pesticide delivery nozzle or outlet is supported directly by the operator.

Hand wash tanks: See Tanks on sprayers

Hazard: The potential of a substance to cause harm (to people, non-target species or the environment) when exposure or contamination has occurred (this does not take account of how the product is to be used and is based only on the properties of the substance).

HSE: Health and Safety Executive

Hydraulic nozzle (jet): A device though which spray liquid is emitted, broken up into droplets and dispersed using the pressurised liquid as the primary source of energy. Flat fan, hollow/solid cones and deflector/flood types most commonly used to apply PPPs

I

Induction bowl (hopper): A low-level filling device for adding pesticides to a sprayer. Many induction bowls have integral pressure rinsing devices for pesticide containers.

Inputs: Products used to produce, enhance, protect or ease the harvest of a crop

Integrated control: Using a combination of biological, biotechnological, chemical, cultural or plant-breeding measures that may minimise PPP inputs without loss of acceptable efficacy and safety

International Standards: Methods and Performance Limits - prepared by International Organisation for Standardisation (ISO) – relating to a whole or specified piece of equipment to help judge its suitability and safety for its intended use.

Inspection: See Testing. In the TOPPS context, an independent, validated test [see NSTS] that properly records and documents the sprayers safety and suitability. Schemes within the EU are currently -voluntary or mandatory, official or non official but are - being unified to conform with EN 13790.

Integrated Crop Management [ICM]: The use of techniques that minimise the economic damage caused by pests whilst having a minimal disturbance on its immediate and wider environment.

Integrated Pest Management(IPM): Practices within the scope of ICM that minimise the use and impact of PPPs within the treated area and the wider environment.

L

Leaching: The movement of pesticide residues through the soil by percolating water.

LEAF Audits: A scheme offering complete farm management tools that encourage adoption of, for example, Crop Protection Management Plans and Integrated Farm Management

Local Environmental Risk Assessment for Pesticides (LERAP): Certain PPPs have a buffer zone requirement to protect aquatic life when applied using a ground crop (boom) sprayer or a broadcast air

assisted sprayer. In some circumstances, the buffer zone requirement stated on the product label can be adjusted to suit individual situations by carrying out a LERAP (www.pesticides.gov.uk).

LIFE: An organisation that co-finances environmental initiatives, such as TOPPS, in the EU.

Liquid disposable fraction: Liquid PPP fractions with uncertain PPP content and concentration such as that on farms when liquids have been contained from the cleaning of spills or non-disposal in the field or from equipment cleaning.

LNR: Local Nature Reserves

M

Maximum Exposure Limit (MEL): The maximum concentration of an airborne substance, averaged over a reference period, which people at work can be exposed to, under any circumstances. The MEL (for each substance which has been assigned one) is given, together with the appropriate reference periods, in Schedule 1 of the COSHH Regulations. See also Workplace Exposure Limit

MNR: Marine Nature Reserves

MS: Member State of the European Union

MSDS: Material Safety Data Sheet

Mist: A space treatment using a droplet size with a volume median diameter of 51 to 100 µm, and with less than 10% by volume smaller than 30 µm.

Mixer or loader: A person who is involved in mixing or loading of PPPs into the tank or induction bowl (hopper) of any PPP application equipment.

Mounted equipment: Any PPP application equipment mounted on, attached to or which forms a permanent part of the prime mover

Multiple rinse: Part of a sequence for containers and/or tanks that have contained PPPs to be cleaned efficiently. Multiple (typically triple) - rather than single - rinsing techniques are more effective when rinsing containers by hand.

N

NNR: National Nature Reserves

NRoSO: National Register of Sprayer Operators

NSTS: National Sprayer Test Scheme refers to a UK annual voluntary test – following agreed protocols and standards - on new and used machines

O

Occupational Exposure Standard (OES): The concentration of an airborne substance, averaged over a reference period, at which, according to current knowledge, there is no evidence that it is likely to harm a person at work repeatedly breathing that concentration. See also Workplace Exposure Limit.

Off-label approval: See 'Specific off-label approval (SOLA)'

Operational control (of exposure): Planning and carrying out work in such a way to prevent or control exposure of the operator (or environmental contamination) when handling and using PPPs (for example, using suitable pack sizes to reduce the number of measuring operations required).

Operator: Any person directly involved in using a PPP (for example, handling, mixing, loading or applying a PPP, calibrating or cleaning equipment, or handling freshly treated material).

Over spray: The accidental or deliberate application of PPP to protected surfaces such as surface water, wells, drains and ditches

P

Patch spraying: Localised applications by boom sprayers of PPP to target surfaces within a defined field/treatment zone/area

Parallel import: An imported PPP identical (as defined in the regulations) to a product already approved in the UK

Pedestrian-controlled equipment: Equipment supported by a mechanical carriage controlled by a person who does not ride in or on the carriage.

Personal protective equipment (PPE): Device or appliance, which conforms to the appropriate standards, designed to be worn or held by an individual for protection against one or more health and safety hazards (for example, by impeding the passage of PPPs into the operator's body). Use of gloves, overalls (coveralls), boots, apron, face masks may be specified.

Pest: Any organism that is harmful to plants, wood or other plant products, any unwanted plant, or any harmful creature

Pesticides: Defined in the Control of Pesticides Regulations (COPR) as any substance, preparation or organism that is prepared or used for controlling any pest.

Pesticide approved for agricultural use: A pesticide (other than one with methyl bromide or chloropicrin as one of its active ingredients) approved for use:

- in agriculture and horticulture (including amenity horticulture);

- in forestry;
- in or near water (other than amateur, public hygiene or anti-fouling uses); or
- as an industrial herbicide (such as weedkillers for use on land that is not intended for the production of any crop).

Plant Protection Product (PPP): Defined in the EC Directive concerning the placing of plant protection products on the market (91/414/EEC) as an active substance or preparation that contains one or more active substances (in the form in which it is supplied to the user) which is intended to:

(a) protect plants or plant products against all harmful organisms or prevent the action of those organisms;
(b) influence the life processes of plants other than as a nutrient (for example, as a growth regulator);
(c) preserve plant products (except for substances or products which are controlled under European Union law on preservatives);
(d) destroy unwanted plants; or
(e) destroy parts of plants or control or prevent the undesired growth of plants.

Point Source: Mainly related to inappropriate handling of the PPP during transport, storage, filling, cleaning, management of remnants and empty packages disposal. In contrast, 'Diffuse Pollution' is mainly related to losses from treated fields due to runoff, leaching and discharge through drainage. Diffuse sources are influenced to a large extent by factors such as field topography, soil and extreme weather conditions soon after the applications as well as the physico-chemical properties of the pesticide itself.

Portable bunds: Devices - typically shallow pool shaped structures - that are temporarily located under the sprayer when being loaded with PPP to contain spills, leaks and other losses

Powders: Dry PPP formulations that may be dispersed in water to form the spray solution

Pre-orifice/Low pressure nozzle: Hydraulic nozzle with an additional (metering) orifice upstream of a larger orifice that forms the spray pattern and atomises the liquid. Resultant lower pressure decreases the proportion of small, drift prone drops.

Prime mover: Self-propelled vehicle operated by a person in or on the vehicle.

Product label: PPPs are only permitted for use in the manner that is described in writing on its label

PSD: Pesticide Safety Directorate is a governmental agency [funded by DEFRA] responsible for UK pesticide registration.

R

Reduced volume spraying: Application of a PPP in a lower volume of water than the minimum volume recommended on the label for that dose.

Regulators/Regulating Bodies: Organisations given the responsibility by governments to ensure the safety of PPP

Remnant [Management]: Remnants of PPPs is that remaining in emptied containers, as unwanted stock or as the surplus and residual liquid/solid after application and that liquid or solid fractions resulting from spills and/or clean-up processes.

Reputable: Individual or association who conform to industry norms and regulations

Respiratory protective equipment (RPE): Any respiratory or breathing apparatus, which conforms to the appropriate standards, designed to prevent or control inhalation exposure to airborne contamination.

Rinsing tank: See Tanks on sprayers

Risk: The likelihood that a substance will cause harm (to people, non-target species or the environment) given the way in which it is, or will be used.

Roller table equipment (conveyor belt-mounted equipment, planter-mounted equipment etc.): Equipment for applying pesticides as a continuous or batch process which is mounted on, attached to, or forms a permanent part of a treatment system.

Rotary atomiser: A device in which a rotating solid surface (for example a cup, disc, wheel or cage) is the primary source of energy used to produce a spray.

Run-off: The uncontrolled movement of applied PPP from its intended surface and/or from the intended treatment zone

S

SAC: Special Areas of Conservation

Safety Data Sheets: See Material Safety Data Sheet. Information on all aspects relating to the PPP safe use

Sedimentation of drift: Drops within a drifting cloud - beyond the directed swath - falling out/sedimenting onto the ground, adjacent crops or surface water

Sedimentation of spray liquid in tank: PPP within a prepared spray solution that is no longer suspended

Seed-treating equipment: Any equipment (either mobile or static) which applies pesticides on cereal grains, pulses and other small seeds.

Sensitive Zone: TOPPS BMPs define three levels to protect water:

High: (1) Unprotected wells & boreholes; shallow aquifers with overlaying permeable soil; zones around wells for drinking water extraction & supply; (2) surface water bodies upstream and close to drinking water abstraction points including land prone to flooding (<=5y frequency), drains, steep slopes or hard sloping surfaces with direct hydraulic connection towards these surface water bodies.

Medium:(1) Naturally protected wells, springs & boreholes; shallow aquifers with overlaying semi-permeable soil; zones around wells & springs; (2) surface water bodies (excluding farm owned isolated ponds for on farm use (fertigation/ irrigation, frost protection)) including land prone to flooding (<=10y frequency), drains, steep slopes or sloping hard surfaces with direct hydraulic connection towards these surface water bodies.

Low: (1) Protected wells & boreholes (such as man made enclosed concrete structure); shallow aquifers with overlaying impermeable soil (typically heavy soil); (2) all other areas with no direct connection towards high or medium sensitive zones such as ditches typically dry in the spray season.

Shrouded boom sprayer: Horizontal boom sprayer (which may be vehicle-mounted, trailed or pedestrian-controlled) incorporating a shroud (possibly with a flexible skirt in contact with the target) designed to prevent, or reduce, off-target drift.

Smoke: A space treatment using a pyrotechnic device to produce smoke containing the pesticide active substance.

Soil erosion: Loss of soil

Solid disposable fractions: Solid PPP fractions with uncertain PPP content and concentration such as on farm collected PPP containing sawdust originating from the cleaning of spills.

Source Protection Zone (SPZ): Areas defined by the Environment Agency (See website) to protect groundwater that is extracted from boreholes and/or springs for public water supply

Specific off-label approval (SOLA): An approved use of a PPP (possibly on a minor crop or in an uncommon situation) in addition to the uses described on the product label. Users of a PPP under the terms of a SOLA must read, understand and follow the approved conditions of use set out in the Notice of Approval for that SOLA (which can be viewed on the PSD website).

SPA: Special Protection Areas

Specifications: Advice on how to avoid point source pollution. May be risk-based and categorised.

Spills: Uncontained losses of PPPs such as drips, leaks, splashes of undiluted or diluted solutions or solids but not that lost in [drift] or after [point source and diffused losses] its dispersal phase. Small spills may be self-managed with the use of kits [see below] whilst major spills may demand emergency services.

Spill absorbing kit: Typically comprising a bag/sack or bucket of sand/sawdust/cat litter. Also available should be PPE, broom, shovel, container with lid/strong plastic bags for contaminated waste, marker pen to label container.

Spray leftovers: **S**pray liquid in the spray tank that can still be sprayed out in the range of nominal sprayer operating settings at the point where the spray operation is finished. Spray leftovers have a known concentration and surplus to immediate task.

Spray quality: A classification reflecting the particle [drop/droplet] size distribution in a spray. The British Crop Protection Council (BCPC) scheme uses the following categories:

Fine aerosol (Fog or Very Fine spray), Coarse aerosol (Fog or Very Fine spray), Mist (Very Fine spray), Fine spray, Medium spray and Coarse spray.

Do note that PPP label advice for field treated agricultural and horticultural crops predominantly use the Fine, Medium or Coarse categories. In practice, further categories such as Very Coarse and Extra Coarse are now commonly used to lessen the risk of drift, downwind fallout and/or to meet other needs.

Spray retention: Sprayed drops adhering to intended target surfaces

Spray tank: Tanks that contain PPP(s) diluted in water as the spray solution with, possibly, additives and/or adjuvants

Spray train: Any vehicle running on rails that has equipment for applying pesticides to the track, trackside or adjacent areas mounted or attached to the vehicle or forming a permanent part of the vehicle.

Sprayer: Any equipment (including boom sprayers) used to apply sprays that have drops within a maximum and minimum size range described by the British Crop Protection Council nozzle

classification scheme categories 'Coarse', 'Medium', 'Fine' and 'Very fine'. Note that this scheme is extended to now include Extra and Very Coarse spray qualities

SSSI: Sites of Special Scientific Interest

Stakeholder: An individual or group with an active, participating interest in the success of this TOPPS initiative.

Standard: A registered guideline based on mutual agreement among Member States and/or international organisations (See International Standards). Among EU Member States, Standards may be referred to or adopted as a "CEN/EN".

Stillage: Frame or stand keeping things off the ground

Store: Building or container used to safely retain PPPs for the time between their delivery and prior to use. Fixed stores are typically dedicated buildings whilst mobile stores are for safe transport of these products to point of use.

Substance hazardous to health: Any substance (including any preparation) which is:

(a) a substance listed in Part I of the Approved Supply List as dangerous for supply within the meaning of the Chemical (Hazard Information and Packaging) Regulations 1993, and which is classified as very toxic, toxic, harmful, corrosive or irritant;
(b) a substance for which a maximum exposure limit is specified in Schedule 1 of the COSHH Regulations or for which the Health and Safety Commission has approved an occupational exposure standard;
(c) a biological agent;
(d) a dust of any kind when present at a substantial concentration in the air;
(e) a substance not mentioned in (a) to (d) above, but which creates a similar hazard to the health of any person.

A substance should be regarded as hazardous to health if it is hazardous in the form in which it is used in the work activity.

Sub-surface liquid applicator: Equipment (except pedestrian-controlled equipment) designed to apply PPPs below the surface of the ground

Surfactant: Products – usually within a prepared formulation of PPPs but sometimes marketed as a separate adjuvant to add to a spray solution - that affect the physical properties of the liquid to, for example, increase wetting of target plant surfaces by lowering the surface tension of the retained drops.

Swath: The width of an area being treated by the single pass of a sprayer. Swath edges taper such that matching, overlapping swaths in a field will offer a more overall uniform distribution despite some variation with steering accuracy.

T

Tanks on the sprayer:

Spray tanks contain PPP(s) diluted in water as the spray solution with, possibly, additives and/or adjuvants

Rinsing tanks contain clean water with, possibly cleaning/deactivating agents and are connected with the hydraulic system of the pump to clean the internal tank surface, to dilute the total or dilutable residual spray and also to supply any external sprayer cleaning device with clean water

Hand wash tanks are for personal hygiene/safety purposes only and are independent of the main sprayer and not an integrated part of the spraying system being sited preferably away from all likely contamination sources.

Tank mix: A spray solution, prepared by the user, containing a mixture of two or more PPPs.

Target surface(s): Surfaces over which the applied PPP is intended to be retained within the treatment zone. Depending on the properties of the applied PPP, these surfaces may be the soil or all plant vegetation or a discrete plant species/variety/cultivar growing amongst others or specific locations on plant surfaces.

Testing: Examination and verification (of spraying equipment) to ensure its fitness of use

Thermal/Temperature inversion: Typically, rising air caused by unequal heating of land surfaces that may induce sprayed drops (at the time of application) or as vapour(often after application) to rise and be moved from treatment zone

TOPPS: "Train the Operators to Prevent Pollution from Point Sources", A three year programme initiated at the end of 2005 by industry with co-funding from the European Commission DG Environment life programme, to address point source contamination with PPPs. (www.topps-life.org)

Total residual spray: See "volume of total residual"

Traceability: Ability to monitor the development of crops at all stages of its production, harvest, transport and storage to consumer

Trailed equipment: PPP application equipment that is trailed behind the prime mover.

Treatment area (zone): Area that is intended for – or has been – treated with PPP
Tremcard: A transport emergency card containing essential information for the driver and the emergency services, which must be prominently displayed in the cab of a vehicle carrying dangerous goods on the road.
Twin-fluid (Bi-fluid) nozzle: Nozzle in which air under pressure is mixed with the spray liquid before it reaches the nozzle orifice. Pressure changes may be used to adjust spray quality and emission rates

U

Under dosed area: An area within the treatment zone that has not for intentional or unintentional reasons received the full Approved dose.
User: Anyone (employers, employees and self-employed people) carrying out the application of PPPs or an activity directly related to that work (such as mixing a PPP or loading a sprayer for another person).

V

Validation: An independent and, often, registered (listed) assessment
Vapour drift: The release and dispersion of PPPs in the vapour form from the intended treatment zone at the time of – or following – their application.
Variable geometry sprayer: Equipment applying PPPs using a boom positioned between a horizontal and vertical plane and being adjusted to needs of target surface.
Vehicle-mounted kerb sprayer: Equipment mounted on, fixed to, or forming part of any vehicle for applying pesticides on roadside kerbs.
Verification: Visual check by the farmer/operator.
VI: Voluntary Initiative is led by UKs Crop Protection Association - in response to Governments general wish for sustainable farming and food - by encouraging nation-wide a higher standard of spraying practices with PPP
Volume Median Diameter (VMD): The volume median diameter is the value at which half the volume of a spray (including mists and fogs) is emitted in drops of a larger size and half the volume is in droplets of a smaller size. The VMD value gives an indication of the spray quality (See Spray Quality).
Volume of total residual: The spray mixture remaining in the sprayer which cannot be delivered with the intended application rate and/or pressure and is equal to the sum of the volume of residual tank and dead volume.
Volume of residual in the tank (dilutable residual volume): Part of the total residual that remains in the tank or that can flow back to the tank during normal sprayer operation

W

Waste: Material no longer part of a production process that cannot be re-used or recycled
Water: Surface water and groundwater.
Ground water is below the soil surface – in soil and rocks - having seeped from surface water such as rain
Surface water includes ponds, rivers, streams and any situation where water is predominantly on the surface
Water volume: The volume of water with which the PPP is to be diluted for use at a prescribed rate that is normally expressed as litres.hectare or l/ha
WDG: Water Dispersible Granule
WFD: Water Framework Directive
Weed wipers or wick applicators: Equipment applying PPP to the target by direct contact with an impregnated absorbent surface (wick, pad or roller).
Wettable Powder (WP): A dry, finely milled PPP that is typically supplied when formulated with other products and inert materials to allow rapid dispersion, suspension and/or dissolving in water for spray application.
Worker (re-entry worker): A person entering a treated crop or area, or handling treated material after a PPP application has taken place (people handling freshly treated material as part of an application operation are normally considered to be operators rather than workers).
Workplace Exposure Limit (WEL): The maximum concentration of an airborne substance, averaged over a reference period, which people at work can be exposed to, under any circumstances. The WEL (for each substance which has been assigned one) is given, together with the appropriate reference periods, in Schedule 1 of the COSHH Regulations. From 2005, WEL values will begin to replace Maximum Exposure Limits (MELs) and Occupational Exposure Standards (OESs) to create a single, simpler system for occupational exposure limits

YOUR Emergency Contact Numbers

Police/Fire/Ambulance	999
NHS Direct	0845 4647
Environment Agency Hotline	0800 80 70 60

Your Farm Location

Contact name

Telephone
Address
Postcode
Grid reference or GPS (Farm)
(Pesticide store)

Local Telephone Numbers

Hospital with A&E
HSE
Doctor
Police
Water
Countryside Watch
Waste Disposal

TOPPS Partners

European Crop Protection Association (ECPA)
E. Van Nieuwenhuyselaan 6
1160 Brussels
Belgium
www.ecpa.be

Harper Adams University College
Edgmond
TF108NB Newport, Shropshire
United Kingdom
www.harper-adams.ac.uk

Arvalis – Institut du Végétal
Station d'expérimentation
91720 Boigneville
France
www.arvalisinstitutduvegetal.fr

Centre National du Machinisme Agricole, du Génie Rural, des Eaux et des Forêts
CEMAGREF
361, Rue Jean François Breton
Montpellier CEDEX
France
www.cemagref.fr

Danish Agricultural Advisory Service, National Centre - DAAS
Udkaersvej 15
Aarhus N
Denmark
www.landscentret.dk

Institute for Land Reclamation and Grassland Farming - IMUZ
Falenty-Aleja Hrabska 3
Raszyn
www.imuz.edu.pl

Landwirtschaftskammer Nordrhein-Westfalen
Nevinghoff 40
48147 Münster
Germany
www.lk-wl.de

pcfruit
Fruittuinweg 1
3800 Sint Truiden
Belgium
www.pcfruit.be

Provinciaal Onderzoeks- en Voorlichtingscentrum voor Land- en Tuinbouw
POVLT
Ieperseweg 87
8800 Rumbeke
Belgium
www.povlt.be

Research Institute of Pomology and Floriculture
Pomologiczna 18
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