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Clarification of Pre-harvest uses of glyphosate

The advantages, best practices and residue monitoring

1. PURPOSE

Public and regulatory discussions about "pre-harvest" treatments with glyphosate are sometimes imprecise or inaccurate regarding how the product is used and its effects. It is important to have a good mutual understanding across the Glyphosate Task Force and stakeholders of what "pre-harvest uses" are. This document is designed to define those uses and their effects.

The EU representative uses for the Renewal of Approval include pre-harvest uses in small grain cereals and oilseed crops. The representative use is the critical Good Agricultural Practice, "GAP", i.e. the use on a crop which gives the maximum potential crop residue.

2. PRE-HARVEST USE

In several north western European countries glyphosate can be applied before crop harvest for weed control, to enhance ripening on non-determinate crops to reduce crop losses, and to help manage determinate crops in wet seasons. Different countries have different recommendations for crops but the common factor is that the bulk grain sample must have dried to a maximum of 30% moisture content. At this point it is physiologically mature and the grain is filled, so glyphosate will not be translocated into the grain from the plant. Growers are recommended to use the lowest appropriate recommended dose for their target use.

The climate in southern Europe is such that few weeds remain green at the time of harvest, and crops typically ripen fully, so pre-harvest use of glyphosate is not normally recommended.

Use to control weeds

Pre-harvest uses were first recommended in the UK in 1980 (O'Keeffe, 1980). The purpose was to control perennial weeds at maturity when they are most susceptible to glyphosate, and particularly Elymus repens to reduce its increasing incidence caused by increased planting of winter cereals and the replacement of deep ploughing by shallower cultivation. Treatment at this time reduces weed growth in the following season due to the translocation of glyphosate to the rhizomes, when the yield advantage is seen. However, reducing the volume of weeds before harvest also makes harvest more efficient.

Sometimes, there is a late growth of weeds including annuals in the crop, where the crop is thin or standard selective weed control has been ineffective. Glyphosate can be used pre-harvest to reduce weed seed return, improve the efficiency of harvesting and to prevent weed seed contamination of the harvested grain.

Thus the main target of such pre-harvest applications of glyphosate for weed control is perennial weeds, when they are most susceptible. Annual weeds can be targeted where there has been a problem during the cropping season, and to help manage weeds resistant to selective herbicides.

Use to ripen crop

Glyphosate does not have true desiccant properties. It disrupts the shikimic acid pathway through inhibition of the 5-enolpyruvylshikimate-3-phosphate synthase (EPSP) enzyme. The resulting deficiency in EPSP production leads to reductions in aromatic amino acids vital for protein synthesis and plant growth (Tomlin 2006; Vencill, 2002). Glyphosate is absorbed by the leaves and stems of plants and is translocated throughout the plant (Roberts 1998) concentrating in meristem tissue (Franz et al, 1997). Translocation into the grain does not occur if treatment is delayed until seed heads or pods are almost ripe (i.e. bulk sample less than 30% moisture).

There are several types of recommendations for crop ripening:

- Crops which ripen non-determinately, i.e. the lower flowers set before the terminal flowers, e.g. oilseed rape. If such crops are left to ripen completely then the lower pods tend to shatter, losing the grain, but if they are harvested before pod shatter occurs then the terminal pods will be unripe and moist. The lower pods take longer from pod set to maturation than the upper pods. The grower must balance these factors when taking a decision on harvest time. Depending on the circumstances, true dessicants or ripening agents such as glyphosate may be helpful. Desiccating herbicides quickly dry out the crop but may increase pod shatter. Glyphosate is slower acting but tends to reduce pod shatter, while helping the crop stems dry out to help harvest.
- Crops which ripen determinately, i.e. the whole grain head ripens at the same time e.g. small grain cereals. Glyphosate must be applied when the seed is physiologically mature, containing less than 30% moisture. The purpose of treatment is different from treatments to non-determinate crops:
  - Some cereal varieties maintain green stems even when the grain is ripe, and the use of certain fungicides may enhance this. In the right weather conditions glyphosate can be used to ripen the stem and green leaves.
  - Secondary tillers can occur when the crop is released from drought in time for tiller formation and after crop damage during the growing season. In these situations there is a clear distinction in maturity between fertile tillers and secondary tillers, and the application of glyphosate can reduce moisture at harvest by drying out the secondary tillers, given time to take effect. In wet harvests the application of glyphosate helps to reduce moisture in the

crop and grain, improving grain quality while helping harvest efficiency and so maintaining yield for the farmer.

3. BENEFITS of using glyphosate pre-harvest in arable crops for perennial weed control

Background

Perennial weeds including grasses, like Common couch *(Elymus repens)*, Onion couch (*Arrhenatherum elatius*), Bent grasses (*Agrostis spp.*), Yorkshire Fog (*Holcus lanatus),* Johnson grass (*Sorghum halepense*), Bermuda grass (*Cynodon dactylon*), Common reed (*Phragmites australis*), and broad-leaved species including docks (*Rumex* spp.), thistles (*Cirsium* spp.), sow-thistles (*Sonchus* spp.), Water knotweed (*Polygonum amphibium*), Field bindweed (*Convolvulus arvensis*), Hedge bindweed (*Calystegia sepium*) as well as volunteer potatoes.

Weed populations can increase rapidly on lighter land in particular with conservation tillage, but also with plough tillage where repeated cultivations cut rhizomes and spread them across fields. Before the advent of glyphosate in 1974, dense infestations of perennial weeds were a huge drag on agricultural production and *E. repens* was managed by raking together rhizomes to be burned (Smith, 2008), frequent ploughing and cultivation, summer fallows or using less effective herbicides like TCA (Fryer & Makepeace, 1978) . *E. repens* can reduce cereal yield by 30-60% (O'Keeffe, 1980, O'Keeffe *et al,* 1981) and *P. australis* by about 20% (Czepó, 2004). As well as causing yield reductions, weeds can support serious pests. For example, *E. repens* carries take all and can act as a bridge between wheat crops in a rotation as an important source of the disease (Oakley & Coulter, 1989), and volunteer potatoes can reduce sugar beet yield and provide a bridge for potato cyst nematode.

The introduction of glyphosate for weed control in stubbles in 1974 allowed growers to control *E. repens* properly, but the autumn timing was restrictive if the crop harvest was late, preventing adequate regrowth of the weeds, particularly perennial broad leaved weeds like *Cirsium arvense*.

Pre-harvest use of glyphosate started in 1980 (O'Keeffe, 1980) and revolutionised perennial weed control. Pre-harvest applications fit glyphosate activity well because at harvest, perennial weeds are at a growth stage which is the most effective time to use glyphosate as there is efficient translocation to the rhizomes and other perennating organs. At this stage green perennial weeds are obvious in the senescing crop enabling spot treatment, reducing costs, residues and environmental load. These summer treatments are usually more effective than treating perennials in stubbles, because of the respective growth stages, and because they are less susceptible to adverse weather conditions. The efficacy of these treatments has been widely demonstrated, for example in Grossbard and Atkinson (1985).

Problems caused by perennial weeds

Perennial weeds can grow rapidly and compete with crops. Controlling them before a crop is sown releases it from this competition with corresponding yield and crop quality benefits.

At harvest time perennial species have a large mass of lush green foliage, may have grown to full maturity above crop height and can smother crops causing difficultly at harvest and increased costs. Harvest is impaired by the moist weed material and by the increased volume of material which reduces forward speed, reduces threshing efficiency, increasing fuel consumption, increases separation losses and means otherwise dry grain will have higher harvested moisture content due to condensation transfer from green wet vegetation.

The main spread of perennial weeds is due to the proliferation of rhizomes or other perennating organs in the soil. Preventing this spread requires a herbicide which is translocated through the plant to reach them. The majority of herbicides are not sufficiently translocated to do this. Glyphosate is an exception and this factor makes it the most reliable herbicide for control of perennial weeds.

Benefits of pre-harvest glyphosate applications for weed control

The UK Home Grown Cereals Authority (HGCA) (2007) summarized the benefits*: "The pre-harvest application of glyphosate for the control of perennial weeds has brought tremendous benefits to the UK farmer. When compared to post-harvest application, it generally increases the control of perennial weeds and, in addition, its time of application does not result in a delay in cultivation after harvest. Indeed, it can be argued that the pre-harvest application has resulted in an overall reduction in glyphosate usage for perennial weed control." and "…pre-harvest application for perennial weed control, has resulted in the potential to reduce significantly the energy involved in crop production and has improved soil management and flexibility in cropping."*

Glyphosate provides >90% control one year after treatment of a wide range of perennial weeds including Common couch at rates of 0.72 to 1.44kg ae/ ha depending on population, other perennial grasses (including *Agrostis* spp, *Holchus lanatus* and *Arrhenatherum elatius*), perennial dicotyledons (including *Rumex*, *Cirsium* and *Sonchus* spp, and *Convolvulus arvensis*) and volunteer potatoes (that are more difficult post-harvest due to frosts) at 1.44 kg ae/ ha (e.g. O'Keeffe & Makepeace, 1985).

Pre-harvest treatments of *E. repens* give higher and more reliable weed control at lower rates in combinable crops, Table 1 (O'Keeffe *et al*, 1981).

Table 1. Weed control from pre-harvest and stubble treatments

Dose (kg ae/ ha)	**Pre-harvest** range of % control 1YAT	**Stubble** range of % control 1YAT
0.72	98 – 99	32 - 95
1.44	98 – 99	92 - 98

Glyphosate pre-harvest gives excellent long-term control of weeds like Common reed which are otherwise difficult to control and have a large green mass at harvest, achieving well above 90% control 2 years after treatment (Czepó, 2004).

Impact on yield and quality

With dense weeds 30-60% increases in yield have been observed in cereals following pre-harvest treatment of the previous cereal crop (O'Keeffe, 1980 & 1981).

Research at Harper Adams Agricultural College (Lunn *et al*, 1997) showed pre-harvest application can improve Hagberg Falling Numbers by killing late tillers. Further work by HGCA (2007) concluded that pre-harvest application of glyphosate as a harvest aid is more beneficial in barley than in wheat. It appeared to reduce both grain and straw moisture content in a range of circumstances in barley, reducing sieving and threshing losses and increasing the throughput of the combine. For wheat there were potential advantages to the harvesting operation of applying pre-harvest glyphosate to wheat to control significant levels of annual or perennial weeds or secondary crop tillers. The extent of the advantage is probably dependent on subsequent weather conditions. Controlling green grains of wheat is also likely to increase the Hagberg Falling Number, i.e. reduce the germination enzyme levels resulting in improved bread-making quality.. These results show the potential of glyphosate to contribute to the drying of grain when weeds are present. The harvesting and storage of dry grain is important to prevent post harvest losses and the development of storage mycotoxins. The main fungus with the potential to cause problems in stored grain north-west Europe is *Penicillium verrucosum*. Under appropriate conditions (≥18% moisture content) this fungus can produce the mycotoxin, ochratoxin A. EU regulations set permissible levels for ochratoxin A at 5 parts per billion (ppb) for cereals at intake. Where grain is stored above 18% moisture content, these levels can be exceeded in two weeks if the temperature is sufficiently high (HGCA, 2011). The principal method by which storage fungi can be controlled is through drying and cooling.

Usage surveys

A farmer survey conducted in Germany in 2012 concluded that approximately 11% of the arable area treated with glyphosate was treated pre-harvest, Table 2 (Steinmann *et al*, 2012).

Table 2: Use of glyphosate in different crops in Germany

Crop	No. farms	% farms with at least 1 glyphosate application during the year	Pre-harvest applications (% crop area)
Winter wheat	804	53.6	2.6
Winter barley	584	48.1	21.7
Rye/triticale	256	31.3	2.8
Spring cereals	250	30.0	1.1
Maize (silage)	474	34.5	0
Maize (corn)	278	36	0
Oil seed rape	493	59.8	2.1
Pulses	100	35	11.8
Sugar beet	300	41.7	0
Potatoes	116	8.6	1.4
Total	896	84.1	11.2

Though not specifically related to pre-harvest treatments, farmers expected an increase in the share of ploughed arable land from 38.1% to 71.4% and the use of cultivators on stubble land is expected to increase about 1.6 passes on average if they were prevented from using glyphosate.

Cook et al. (2010) report that in the UK, the area treated pre-harvest is higher than in Germany (Table 3). This could be attributed to moister weather conditions in the British Isles compared to the continental influence which promotes natural drying of crops in many parts of Germany (Steinmann et al, 2012).

Table 3. Use of pre-harvest treatments in wheat and oilseed rape in the UK

% crop area treated pre-harvest with glyphosate			
	UK Pesticide Use Survey 2008	West England 2009 (focus groups)	East England 2009 (focus groups)
Wheat	8	40	25
Oilseed rape	64	75	70

In another farmer survey, Garvert *et al* (2013) concurred with Steinmann *et al* that pre-harvest treatment only plays a subordinate role for the whole of Germany, but point to large regional differences. In the coastal region around 65% of the winter barley area was reported as treated pre-harvest due to the large volume of green weed present at harvest. In the east, pre-harvest treatment plays an important role to improve harvest management and in a typical year, about 10% of the winter cereals and winter rapeseed crops are treated. In wet years this can increase up to 20%. In the remaining regions, less than 5% of the arable land is treated.

4. BEST PRACTICE for the application of glyphosate pre-harvest

The nature of pre-harvest glyphosate use means that applications are made close to harvest. Users should aim to ensure residues of glyphosate are kept to a minimum and follow Good Agricultural Practice to ensure residue levels are below the MRL (Maximum Residue Level):

- **Always follow the label recommendations**
- The lower the dose the lower the potential residue
  - Select the lowest appropriate dose rate to achieve the required effects where a range is recommended.
  - Never use a higher dose rate in an effort to speed up the effect.
- Correct application timing is critical to ensure maximum yields, optimum combining time and minimum residues in the grain
  - Consult the suppliers' timing guides prior to use.
  - Apply glyphosate when the bulk sample of seed has 30% grain moisture or less. In cereals this is when the grain will just retain a thumbnail imprint. At this stage the grain is physiologically ripe and no movement (translocation) will take place within the plant from the leaf to the grain. Any residues will be confined to the outside as a direct result of spray deposits.
  - Do not apply earlier than recommended (i.e. to immature grain)
- Never harvest earlier than the minimum recommended harvest interval. These may vary between crops and between countries, but the earliest harvest is never less than 7 days after treatment.
- Do not use adjuvants which "stick" the glyphosate to the outside of the grain.

Experience has shown that, by following these recommendations, any residues in the grain are well below the MRL.

5. MONITORING RESIDUES

Many residue trials have been carried out over many years with pre-harvest uses. The residue data from these trials are used as the basis for the setting maximum residue levels (MRLs) for crops like cereals, pulses and oil seed crops where pre-harvest treatments are recommended. These MRLs are set for the highest recommended doses for weed control with the shortest pre-harvest interval (the „critical GAP“). Such MRLs should not be confused with toxicology thresholds. Exceeding an MRL normally provides an indication that recommendations were not respected by the user but rarely indicates risk to consumers or livestock. Residue data are also used to calculate the theoretical maximum daily intake (TMDI) of a pesticide. In the regulatory approval process the TMDI is compared to the Acceptable Daily Intake (ADI) in a dietary risk assessment. MRLs are only established where resultant dietary exposures do not present either acute or long term risks for consumers. The threshold for dietary risk is set with a safety factor of 100.

Official residue monitoring programs of commercial crop commodities only a small fraction of commodities shows actual detectable residues. For example, the most recent (2010) EFSA report on pesticide residues in food focusses on oats and rye, both crops which may be treated pre-harvest. For oats 23.8% of samples showed detects but none exceeded the MRL and all residues were less than 5% of the MRL. There were only 3 detects in rye, all <5%MRL. Combining these EU data with national monitoring programmes for cereals showed no MRL exceedances, and 75 detects/878 samples (8.5%). No acute dietry risk assessment was considered necessary and the long term risk assessment determined that the highest dietary risk, TMDI/ADI, was 0.46%, i.e. a very large margin of safety. Glyphosate was amongst 78 out of a total of 178 pesticides (44%) with an exposure (TMDI) less than 1% of ADI (p.162, Figure 5-4).

Table 4. Residues in cereal crops in the 2010 EU-coordinated programme

	No. Samples analysed	Samples with glyphosate detected		Mean residue		Highest residue measured[4]	% exceeding MRL	EU MRL
		number	%	mg/kg	% MRL	mg/g		
Oats	126[1]	30[1]	23.8	0.19	0.95	2.10	0.0	20
Rye	132[3]	3[3]	2.3	0.12	0.6	0.36	0.0	10

1 Figure 3-16, page 70　　3Figure 3-20, page 78
2 Table 3-7 , page 69　　4Appendix IV, page 625
http://www.efsa.europa.eu/en/efsajournal/pub/3130.htm

The EFSA residue monitoring reports also summarise the analyses of pesticides in Member States. Those for glyphosate in cereals are presented below. These data indicate detections only and do not give the level of residues found or residues in different cereal crops. They indicate the low detection rate for glyphosate in cereals in these monitoring programmes.

Table 5. Residues in cereal crops in Member State monitoring programmes

Year of monitoring	Total no. determinations	Total no. of detections	Detections as % of determinations	No. countries	Source: EFSA report page
2008	646	38	5.88	6	page 242
2009	Link broken[1]				
2010	878	75	8.54	15	Page 365

http://www.efsa.europa.eu/en/efsajournal/pub/2430.htm

The most recent UK residue survey data on bread is from samples taken in 2011 and reported in 2012, Table 6 (Anon, 2012 a, b). Residues were detected at low levels (<1.0 mg/kg) in 11% of the samples. Wholemeal bread accounted for 54% of the detections, reflecting the use of flour made from the whole grain including the outer coat which is more directly exposed to pre-harvest treatments.

Table 6. Residues in bread from UK samples taken in 2011

	No. of determinations	No. of detections	Detected residues (mg/kg)
All breads	217	24	0.1-
Ordinary bread			
"other"	32	1	0.4
White	70	7	0.1-0.2
Wholemeal	35	13	0.1-0.9

http://www.pesticides.gov.uk/guidance/industries/pesticides/advisory-groups/PRiF/PRiF_Results_and_Reports/index-to-results-by-food-pesticide-residues.htm#bread_and_pasta

Monitoring of residues in plant-based food in Germany showed no samples which exceeded the maximum residue limit, and detected glyphosate at levels exceeding the detection limit in 27 out of 1230 analyses (Deutcher Bundestag, 20011).

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References

Anon (2012a) Report on the Pesticide Residues Monitoring Programme for Quarter 3 2011. The Expert Committee on Pesticide Residues in Food. http://www.pesticides.gov.uk/Resources/CRD/PRiF/Documents/Results%20and%20Reports/2011/Q3_2011.pdf

Anon (2012b) Report on the Pesticide Residues Monitoring Programme for Quarter 4 2011. The Expert Committee on Pesticide Residues in Food. http://www.pesticides.gov.uk/Resources/CRD/PRiF/Q4_2011_report.pdf

Cook, S.K., Wynn, S.C., Clarke, J.H. (2010) Glyphosate – a necessary herbicide: how valuable is glyphosate to UK agriculture and the environment? Outlooks on Pesticide Management – December 2010, 280-283.

Czepó, M. (2004) Betakarítás és megtakarítás. *Növények védelme*, 6-7.

Deutcher Bundestag (2011) Drucksache 17/7168, 27.09.201, 16-17. http://dipbt.bundestag.de/dip21/btd/17/071/1707168.pdf

EFSA (2010) 2008 Annual Report on Pesticide Residues according to Article 32 of Regulation (EC) No 396/2005. Scientific Report of EFSA, EFSA Journal 2010: 8(6): 1646

EFSA (2013) The 2010 European Union Report on Pesticide Residues in Food. Scientific Report of EFSA, EFSA Journal 2013: 11(3): 3130

Franz, J. E.; Mao, M. K.; Sikorski, J. A. (1997) Glyphosate: A Unique Global Herbicide; American Chemical Society: Washington, DC, 1997; pp 521-527, 604-605, 615

Fryer, J.D., Makepeace, R.J. (1978) Weed Control Handbook, Volume II – Recommendations, 8th Edition, Chapter 12: Notes on the Control of Some Individual Weeds. British Crop Protection Council. 357-362.

Garvert, H., Schmitz, P.M, Ahmed, M.N. (2013) The use of glyphosate in Germany: agro-economic analysis of the use of glyphosate in Germany. Outlooks on Pest Management – April 2013, 81-85.

Grossbard E and Atkinson D, 1985. The Herbicide Glyphosate. Butterworths, London, p.425.

HGCA (2007) Research Review No. 65. Pre-harvest glyphosate for weed control and as a harvest aid in
cereals. Orson J H and Davies D K H.

HGCA (2011) HGCA Grain storage guide for cereals and oilseeds, Third edition. Ed. Emily Boys, HGCA. http://www.hgca.com/document.aspx?fn=load&media_id=7326&publicationId=8742

Lunn, G.D., Major, B.J. and Kettlewell, P.S. (1997) Investigation of the effects of glyphosate (Roundup Biactive). Report to Monsanto.

Oakley, J.N., Coulter, R.M.A. (1989) Pests and diseases of cereals. In Pest and Disease Control Handbook, 3rd edition, Eds Scopes, N. & Stables, L.. British Crop Protection Council. 125-150.

O'Keeffe, M.G. (1980) The control of *Agropyron repens* and broad-leaved weeds pre-harvest of wheat and barley with the isopropylamine salt of glyphosate. *Proceedings 1980 British Crop Protection Conference – Weeds, Brighton*, 53-60.

O'Keefe, M.G., Richards, M.C., Sheppard, B.W. (1981) The effect on crop safety and weed control from applications of isopropylamine salt of glyphosate pre-harvest of cereals. *Proceedings of the Conference on Crop Protection in Northern Britain, Dundee,* British Crop Protection Council,51-56.

O'Keeffe, M.G., Makepeace, R.J. (1985) Efficacy of glyphosate in arable situations. In *The Herbicide Glyphosate*, ed. Grossbard, E., Atkinson, D, Butterworths, 418-434.

Roberts, T. R. Metabolic Pathways of Agrochemicals-Part 1: Herbicides and Plant Growth Regulators; The Royal Society of Chemistry: Cambridge, UK, 1998; pp 396-399

Smith, G. (2008) From Kendall to Campbell – A history of the NFU. Halsgrove.

Steinmann, H.H, Dickeduisberg, M., Theuvsen, L. (2012) Uses and benefits of glyphosate in German arable farming. *Crop Protection* **42**, 164-169

Tomlin, C. D. S. The Pesticide Manual: A World Compendium, 14th ed.; British Crop Protection Council: Hampshire, UK, 2006; pp 545-548.

Vencill, W. K. Ed., Herbicide Handbook, 8th ed.; Weed Science Society of America: Lawrence, KS, 2002; p 231-234

ANNEX

EU Member State registrations for pre-harvest treatments

Pre-harvest uses were evaluated in the Annex I inclusion evaluation for glyphosate, again in the post Annex I inclusion residues review in 2005, and have been supported in the dossier submitted for Renewal of Approval

	pre harvest approved?	Oilseed rape	Mustard	cereals	maize	Peas/ beans	Flax/ linseed	Soya bean	Sun flower	sorghum
Austria	No suspended 2013									
Belgium	Yes	x	x	x	-	x	x	-	-	-
Bulgaria	Yes	-	-	x	-	-	-	x	x	-
Cyprus	No	-	-	-	-	-	-	-	-	-
Denmark	Yes	x	x	x fodder	-	x	-	-	-	-
Estonia	Yes	x	x	x fodder	-	-	x	-	-	-
Finland	Yes	x	x	x fodder	-	-	-	-	-	-
France	Yes	x	-	x	-	-	-	-	-	-
Germany	Yes	x	x	x	-	x	-	-	-	-
Greece	No	-	-	-	-	-	-	-	-	-
Hungary	Yes	x	-	x	x	-	-	X	x	-
Ireland	Yes	x	x	x	-	x	x	-	-	-
Italy	Yes	-	-	x	-	-	-	-	-	-
Latvia	Yes	x	x	x	-	x	x	-	-	-
Lithuania	Yes	x	x	x	-	x	x	-	-	-
Malta	Yes	-	-	x	-	-	-	-	-	
Netherlands	Yes	x	x	x	-	x	x	-	-	-
Norway	Yes	x	x	x fodder	-	x	-	-	-	-
Poland	Yes	x	x	x	x	x	x	-	-	-
Portugal	No	-	-	-	-	-	-	-	-	-
Romania	Yes	x	-	x	x	-	-	-	x	x
Slovakia	Yes	-	-	x	x	-	x	x	x	x
Spain	No	-	-	-	-	-	-	-	-	-
Sweden	Not cereals (but uses Article 53 derogations)	x	x	-	-	-	-	-	-	-
UK	Yes	x	x	x	-	x	x	-	-	-

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