

## Supplementary material

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EDCs within the WFD and specifically within the guidance for deriving EQSs

*Table S1 – Complete list of quotations relating to EA and ED within TGD EQS (E.C., 2018) using the following keywords : « Endocrine », « Hormone », « Estrogen » (or « Oestrogen »), « Androgen » and « Thyroid » ; TGD EQS corresponding chapters ; parameters to which quotation refers (QS derivation in general or specific relation to Assessment Factor (AF) or to tests recommended for the building of the ecotoxicity and toxicity dataset used for the EQS derivation) ; numbers of quotes in the core text or in the appendices.*

Keywords	Quotes	Section	Relating to...			Nb of quotes	
			QS	AF	Tests	in core text	in App.
<b>Endocrine</b>	<i>If there are indications of <b>endocrine activity</b> (e.g. bioassays), but no studies are available that allow assessment of adverse effects through this mechanism, this should be <b>highlighted as an uncertainty</b> in the technical report.</i>	2. GENERIC ISSUES 2.6 Data... 2.6.1 Types of data required... 2.6.1.2 Ecotoxicological data	✓	(✓)		5	6
	<i>Regarding the recommendation for the adoption of EQS Predicted No Effect Concentrations (PNECs) as QSs and the circumstances that could prompt a review of the RAR PNEC: * If there is new evidence for a mode of toxic action that was not considered in the RAR e.g. new evidence of <b>endocrine disrupting properties</b>.</i>	2. GENERIC ISSUES 2.8 Using existing risk assessments 2.8.1 Risk assessments under Existing Substances Regulations	✓	(✓)			
	<i>If there are indications of adverse effects via <b>endocrine activity</b> (e.g. <i>in vivo</i> bioassays) or other specific effects that have not been adequately reflected in bird or mammal studies used to derive the NOAELoral (e.g. only 28-day studies are available), <b>an additional assessment factor may be considered to cover the anticipated effects</b>.</i>	2.9 Extrapolation 2.9.1 Mode of action	✓	✓			
	<i>When there are indications that a substance may cause adverse effects via <b>disruption of the endocrine system</b> of mammals, birds, aquatic or other wildlife species, the assessor should consider whether the assessment factor would be sufficient to protect against effects caused by such a mode of action, or whether a larger AF is needed (Section 2.9.1).</i>	3 STANDARDS TO PROTECT WATER QUALITY 3.3 Deriving a QS <sub>fw, eco</sub> 3.3.1 Derivation of a QS <sub>fw, eco</sub> 3.3.1.1 Extrapolation using AF method	✓	✓			

Keywords	Quotes	Section	Relating to...			Nb of quotes	
			QS	AF	Tests	in core text	in App.
	When there are indications that a substance may cause adverse effects via <b>disruption of the endocrine system</b> of mammals, birds, aquatic or other wildlife species, it should be considered whether the assessment factor would also be sufficient to protect against effects caused by such a mode of action, or whether an increase of the factor would be appropriate.	3 STANDARDS TO PROTECT WATER QUALITY 3.3 Deriving a QSfw, eco 3.3.2 Derivation of a QSsw, eco 3.3.2.1 Extrapolation using AF method	✓	✓			
	Description of toxicity tests and their purpose(s)/endpoints meanings  <u>Invertebrates</u> <ul style="list-style-type: none"><li>• OECD guideline 211: Daphnia magna Reproduction Test.</li></ul> <u>Fish</u> <ul style="list-style-type: none"><li>• OECD guideline 234: Fish Sexual Development Test.</li><li>• OECD guideline 240: Medaka Extended One Generation Reproduction Test (MEOGRT)</li></ul> <p>* screening tests / only be used as supporting information with regard to EQS-derivation:</p> <ul style="list-style-type: none"><li>• OECD guideline 229: Fish Short Term Reproduction Assay</li><li>• OECD guideline 230: 21-day Fish Assay</li></ul> <u>Amphibians</u> <ul style="list-style-type: none"><li>• cf. keyword "Thyroid" : OECD guideline 241</li></ul>	APPENDIX 1: DATA COLLECTION, EVALUATION AND SELECTION A1.3. TOXICITY DATA A1.3.2. Data evaluation and data tables A1.3.2.10. Use of toxicity tests performed according to established guidelines			✓		
	OECD (2012). Guidance document on standardised test guidelines for evaluating chemicals for endocrine disruption. Series on Testing and Assessment. No. 150, OECD Environment Directorate, Paris	APPENDIX 1: DATA COLLECTION, EVALUATION AND SELECTION A1.6. REFERENCES TO APPENDIX 1			✓		
	Table 2 Existing evaluations and Regulatory information <i>Endocrine disrupter: Available information / Not investigated</i>	APPENDIX 2: PROFORMA FOR EQS DATASHEET					

Keywords	Quotes	Section	Relating to...			Nb of quotes	
			QS	AF	Tests	in core text	in App.
Hormone*	-	-				0	0
Estrogen*	<i>Under some circumstances, a MAC-QS may not be justified, e.g. for substances that exert only sub-lethal effects after prolonged exposure. Steroid oestrogens could be one example.</i>	3 STANDARDS TO PROTECT WATER QUALITY 3.4 Deriving a MAC-QS	✓			1	0
Androgen*	Description of toxicity tests and their purpose(s)/endpoints meanings  <u>Fish</u> * screening tests / only be used as supporting information with regard to EQS-derivation: • OECD Guidance document on the Androgenised Female Stickleback Screen (series on Testing and Assessment No. 148) (AFSS)	APPENDIX 1: DATA COLLECTION, EVALUATION AND SELECTION A1.3. TOXICITY DATA A1.3.2. Data evaluation and data tables A1.3.2.10. Use of toxicity tests...			✓	0	1
Thyroid*	Description of toxicity tests and their purpose(s)/endpoints meanings  <u>Amphibians</u> • OECD guideline 231: Amphibian Metamorphosis Assay (AMA) • OECD guideline 241: The Larval Amphibian Growth and Development Assay (LAGDA)	APPENDIX 1: DATA COLLECTION, EVALUATION AND SELECTION A1.3. TOXICITY DATA A1.3.2. Data evaluation and data tables A1.3.2.10. Use of toxicity tests...			✓	0	2
Steroid*	cf. keyword "Estrogen"	3 STANDARDS TO PROTECT WATER QUALITY 3.4 Deriving a MAC-QS	✓			1	0

## Analysis of EQS factsheets for the 180 chemicals universe

In consideration of the lack of prescription included in the TGD EQS regarding ED, an analysis of the state of the art was undertaken on how far and how consistently endocrine disrupting (ED) properties were considered in the derivation of EQS.

To achieve this goal, a list of 180 chemicals was compiled for which EU or national EQS were available with an explanatory document (« EQS factsheets/dossiers »).

For all 180 candidate chemicals, data were retrieved from the EQS factsheets available: EA or ED notification published within the context of an EDCs prioritisation initiatives and within the scientific literature, key information on the QSs and EQS derivation (Key study(ies) and key effect(s) considered for the calculation of QS, AF used for the calculation of QS and the reasoning-behind statement, possible additional AF applied for the purpose of consideration of ED potential of the chemical, key QS for the derivation of the EQS).

The information gathered was sequentially analysed and allowed the categorisation of existing EQS into 4 categories:

- Cat. 4: chemicals for which no ED evidence is available;
- Cat. 3: chemicals for which ED potential was notified and taken account of appropriately;
- Cat. 2 : chemicals for which the screening of the EQS value and factsheet showed that ED potential was considered but that the rationale stating choices made was not clear enough in this regard;
- Cat. 1: chemicals for which EQS did not consider endocrine activity although there are substance-specific data suggesting or evidencing such activities:
  - Cat. 1 C: no indication or consideration of the ED potential in the EQS factsheet although it exists in the scientific literature
  - Cat. 1 B: no indication or consideration of the ED potential in the EQS factsheet although it exists in a prioritisation initiative
  - Cat. 1 A: ED effects were quoted in the EQS factsheets but not considered for EQS derivation

Detailed results of this analysis are presented herein in Table S2

Table S2 : Outcome of the analysis of ED substances considered in EQS and subsequent categorisation for 180 candidates. Substances are ranked by category and alphabetical order.  
E.C. (2013) (2005) = EQS established by the European Commission in 2005 for priority substances and reported within the daughter Directive 2013/39/EC, E.C. (2013) (2011) = EQS established by the European Commission in 2011 for priority substances and reported within the daughter Directive 2013/39/EC ; JORF2015 + INERIS = EQS established by the French Ministry in charge of the environment based on INERIS proposal and applying for French RBSPs; VGE = Environmental Guideline Value proposed by INERIS for potential implementation as EQSs, but not legally-binding.

Substance name	CAS Number	EQS Source	CATEGORY	edlists.org (updated Sept. 2021)
Acetochlore	34256-82-1	INERIS (2014)	1A	
Alachlore	15972-60-8	E.C. (2013) (2005)	1A	
Atrazine	1912-24-9	E.C. (2013) (2005)	1A	
Chloro-4 Methylphenol-3	59-50-7	INERIS (2011)	1A	
Diuron	330-54-1	E.C. (2013) (2005)	1A	List II
Endosulfan	115-29-7	E.C. (2013) (2005)	1A	
ETU (ethylene thiouree)	96-45-7	INERIS (2015)	1A	
Fenitrothion	122-14-5	INERIS (2011)	1A	
Hexachlorobenzene	118-74-1	E.C. (2013) (2005)	1A	
Hexachlorocyclohexane (all isomers, including lindane)	608-73-1	E.C. (2013) (2005)	1A	
Lambda-cyhalothrine	91465-08-6	INERIS (2011)	1A	
Nonylphenol-4 (ramifie)	84852-15-3	E.C. (2013) (2005)	1A	List I
Nonylphenols	25154-52-3	E.C. (2013) (2005)	1A	List I
Octylphenol-para-tert-	140-66-9	E.C. (2013) (2005)	1A	List I
Octylphenols	1806-26-4	E.C. (2013) (2005)	1A	
Trichlorfon	52-68-6	INERIS (2009)	1A	
Bifentrine	82657-04-3	INERIS (2011)	1B	
C10-13-chloroalcanes	85535-84-8	E.C. (2013) (2005)	1B	
Chlorfenvinphos	470-90-6	E.C. (2013) (2005)	1B	
Cypermethrine	52315-07-8	E.C. (2013) (2011)	1B	
Nonylphenol-4-(para)-	104-40-5	E.C. (2013) (2005)	1B	List I
Pentachlorobenzene	608-93-5	E.C. (2013) (2005)	1B	
Pentachlorophenol	87-86-5	E.C. (2013) (2005)	1B	
Terbutryne	886-50-0	E.C. (2013) (2011)	1B	
Trichlorobenzene	12002-48-1	E.C. (2013) (2005)	1B	
Trifluraline	1582-09-8	E.C. (2013) (2005)	1B	
Acide perfluoro sulfone (PFOA) et ses derives (PFOS)	1763-23-1	E.C. (2013) (2011)	1C	
Anthracene	120-12-7	E.C. (2013)	1C	
Antimoine	7440-36-0	INERIS (2014)	1C	
Arsenic et composes mineraux	7440-38-2	INERIS (2015)	1C	
Benzene	71-43-2	E.C. (2013)	1C	
Cadmium et composes	7440-43-9	E.C. (2013) (2005)	1C	
Carbamazepine	298-46-4	INERIS (2012)	1C	
Chloroaniline-2	95-51-2	INERIS (2012)	1C	
Chloroforme	67-66-3	E.C. (2013)	1C	
Chlorophenol-4	106-48-9	INERIS (2011)	1C	
Chlorpyriphos-Ethyl	2921-88-2	E.C. (2013) (2005)	1C	
Dichloromethane	75-09-2	E.C. (2013) (2005)	1C	List II
Dichlorure de dibutyletain	683-18-1	INERIS (2009)	1C	
Dichlorvos	62-73-7	E.C. (2013)	1C	
Diclofenac sodium	15307-86-5	INERIS (2015)	1C	
Difenoconazole	119446-68-3	INERIS (2013)	1C	
Epoxiconazole	133855-98-8	INERIS (2011)	1C	
Fenbuconazole	114369-43-6	INERIS (2013)	1C	
Glyphosate	1071-83-6	JORF2015 + INERIS (2014)	1C	
Hexachlorobutadiene	87-68-3	E.C. (2013) (2005)	1C	

Substance name	CAS Number	EQS Source	CATEGORY	edlists.org (updated Sept. 2021)
Hexaconazole	79983-71-4	INERIS (2011)	1C	
Mercure et composés	7439-97-6	E.C. (2013) (2005)	1C	
Naphtalene	91-20-3	E.C. (2013) (2011)	1C	
Nickel	7440-02-0	E.C. (2013) (2011)	1C	
Oxyde d'heptachlore (cis)	1024-57-3	E.C. (2013) (2011)	1C	
Oxydemeton-méthyl	301-12-2	INERIS (2009)	1C	
Paraquat	4685-14-7	INERIS (2012)	1C	
Penconazole	66246-88-6	INERIS (2013)	1C	
Pendimethaline	40487-42-1	JORF2015 + INERIS (2015)	1C	
Plomb	7439-92-1	E.C. (2013) (2011)	1C	
Propiconazole	60207-90-1	INERIS (2015)	1C	
Pyrimethanil	53112-28-0	INERIS (2011)	1C	
tebuconazole	107534-96-3	JORF2015 + INERIS (2011)	1C	
Terbutylazine	5915-41-3	INERIS (2011)	1C	
Triclosan	3380-34-5	INERIS (2012)	1C	List II
2,4,5-T	93-76-5	INERIS (2013)	2	
Carbendazime	10605-21-7	INERIS (2011)	2	
Chlordane	57-74-9	INERIS (2012)	2	
Chlordecone	143-50-0	JORF2015 + INERIS (2013)	2	
Composés du tributyletaine	688-73-3	E.C. (2013) (2005)	2	
Dibromoéthane-1,2	106-93-4	INERIS (2009)	2	
Diméthoate	60-51-5	INERIS (2009)	2	
Epichlorohydrine	106-89-8	INERIS (2009)	2	
octaBDE	32536-52-0	E.C. (2013) (2011)	2	
pentaBDE	32534-81-9	E.C. (2013) (2011)	2	
Simazine	122-34-9	E.C. (2013) (2005)	2	
Tributyletaine cation	36643-28-4	E.C. (2013) (2005)	2	
2,4-D (including 2,4-D salt and esters)	94-75-7	JORF2015 + INERIS (2012)	3	
Aminotriazole	61-82-5	JORF2015 + INERIS (2011)	3	
Di(2-éthylhexyl)phtalate (DEHP)	117-81-7	E.C. (2013) (2005)	3	List I
Dichloroaniline-3,4	95-76-1	INERIS (2012)	3	
Dicofol	115-32-2	E.C. (2013) + INERIS (2012)	3	
Heptachlore	76-44-8	E.C. (2013) (2011)	3	
Iprodione	36734-19-7	JORF2015 + INERIS (2015)	3	
Linuron	330-55-2	JORF2015 + INERIS (2009)	3	
Mancozebe	8018-01-7	INERIS (2014)	3	List I
Ométhoate	1113-02-6	INERIS (2009)	3	
Perchlorate d'ammonium	7790-98-9	INERIS (2012)	3	List II
Procymidone	32809-16-8	INERIS (2011)	3	
Propanil	709-98-8	INERIS (2009)	3	
Acide monochloroacétique	79-11-8	INERIS (2013)	4	
Aclonifen	74070-46-5	E.C. (2013) (2011)	4	
AMPA	1066-51-9	JORF2015 + INERIS (2014)	4	
azoxystrobine	131860-33-8	JORF2015 + INERIS (2011)	4	
bentazone	25057-89-0	JORF2015 + INERIS (2009)	4	
Benzidine	92-87-5	INERIS (2013)	4	
Bifenox	42576-02-3	E.C. (2013) (2011)	4	
Biphenyle	92-52-4	JORF2015 + INERIS (2013)	4	
Boscalid	188425-85-6	JORF2015 + INERIS (2014)	4	
Chloro-1 Dinitrobenzene-2,4	97-00-7	INERIS (2012)	4	
Chloro-4 Nitroaniline-2	89-63-4	INERIS (2012)	4	
Chloroaniline-3	108-42-9	INERIS (2011)	4	
Chloroaniline-4	106-47-8	INERIS (2011)	4	
Chloronaphthalène-1	90-13-1	INERIS (2011)	4	
Chloronaphthalène-2	91-58-7	INERIS (2011)	4	
Chloronitrobenzene-1,2	88-73-3	INERIS (2012)	4	
Chloronitrobenzene-1,3	121-73-3	INERIS (2012)	4	
Chloronitrobenzene-1,4	100-00-5	INERIS (2011)	4	
Chlorophénol-2	95-57-8	INERIS (2012)	4	
Chlorophénol-3	108-43-0	INERIS (2011)	4	

Substance name	CAS Number	EQS Source	CATEGORY	edlists.org (updated Sept. 2021)
Chlorotoluene-2	95-49-8	INERIS (2012)	4	
Chlorotoluene-3	108-41-8	INERIS (2011)	4	
Chlorotoluene-4	106-43-4	INERIS (2009)	4	
chlorprophame	101-21-3	JORF2015 + INERIS (2014)	4	
Chlortoluron	15545-48-9	JORF2015 + INERIS (2013)	4	
Chlorure de vinyle	75-01-4	INERIS (2009)	4	
Cybutryne	28159-98-0	E.C. (2013) (2011)	4	
Cypoconazole	94361-06-5	INERIS (2011)	4	
Cyprodinil	121552-61-2	JORF2015 + INERIS (2011)	4	
Dicamba	1918-00-9	INERIS (2011)	4	
Dichlorobenzidine-3,3'	91-94-1	INERIS (2013)	4	
Dichloro-di-isopropyl ether	108-60-1	INERIS (2012)	4	
Dichloroethane-1,2	107-06-2	E.C. (2013) (2005)	4	
Dichloroethene-1,2	540-59-0	INERIS (2009)	4	
Dichloroethylene-1,1	75-35-4	INERIS (2015)	4	
Dichloronitrobenzene-2,3	3209-22-1	INERIS (2009)	4	
Dichloronitrobenzene-2,4	611-06-3	INERIS (2009)	4	
Dichloronitrobenzene-3,4	99-54-7	INERIS (2009)	4	
Dichloropropene-1,3	542-75-6	INERIS (2009)	4	
Dichlorprop	120-36-5	INERIS (2009)	4	
Diflufenicanil	83164-33-4	JORF2015 + INERIS (2012)	4	
Dimethenamide	87674-68-8	INERIS (2011)	4	
Dimethenamid-P	163515-14-8	INERIS (2011)	4	
Dimethomorphe	110488-70-5	INERIS (2011)	4	
EDTA	60-00-4	INERIS (2012)	4	
Flufenacet	142459-58-3	INERIS (2015)	4	
Flumioxazine	103361-09-7	INERIS (2015)	4	
Fluoranthene	206-44-0	E.C. (2013) (2011)	4	
Fluroxypyrr	69377-81-7	INERIS (2015)	4	
Fluroxypyrr methyl heptyl ester	81406-37-3	INERIS (2015)	4	
Formaldehyde	50-00-0	INERIS (2011)	4	
HexaBromoCycloDoDecane (HBCDD)	25637-99-4	E.C. (2013) + INERIS (2012)	4	
Hexabromocyclododecane-1,2,5,6,9,10	3194-55-6	E.C. (2013) (2011)	4	
Hexabromocyclododecane-alpha	134237-50-6	E.C. (2013) (2011)	4	
Hexabromocyclododecane-beta	134237-51-7	E.C. (2013) (2011)	4	
Hexabromocyclododecane-gamma	134237-52-8	E.C. (2013) (2011)	4	
Hexachlorocyclohexane alpha	319-84-6	E.C. (2013) (2005)	4	
Hexachloroethane	67-72-1	INERIS (2009)	4	
Imazalil	35554-44-0	INERIS (2015)	4	
Imidaclopride	138261-41-3	JORF2015 + INERIS (2011)	4	
Isopropylbenzene	98-82-8	INERIS (2012)	4	
Isoproturon	34123-59-6	E.C. (2013) (2005)	4	
Isoxaben	82558-50-7	INERIS (2014)	4	
Isoxaflutole	141112-29-0	INERIS (2015)	4	
MCPA-2,4	94-74-6	JORF2015 + INERIS (2013)	4	
Mecoprop	93-65-2	INERIS (2013)	4	
Metaldehyde	108-62-3	JORF2015	4	
Metamitrone	41394-05-2	INERIS (2011)	4	
metazachlore	67129-08-2	JORF2015 + INERIS (2011)	4	
Methabenzthiazuron	18691-97-9	INERIS (2011)	4	
Methamidophos	10265-92-6	INERIS (2012)	4	
Monochloramine	10599-90-3	INERIS (2009)	4	
Monolinuron	1746-81-2	INERIS (2009)	4	
Nicosulfuron	111991-09-4	JORF2015 + INERIS (2011)	4	
Oxadiazon	19666-30-9	JORF2015 + INERIS (2014)	4	
Oxyde de dibutyletaine	818-08-6	INERIS (2011)	4	
Oxyfluorfene	42874-03-3	INERIS (2014)	4	
Phosphate de tributyle	126-73-8	JORF2015 + INERIS (2013)	4	
Phoxime	14816-18-3	INERIS (2009)	4	
Prosulfocarbe	52888-80-9	INERIS (2014)	4	

Substance name	CAS Number	EQS Source	CATEGORY	edlists.org (updated Sept. 2021)
Pyrazon/chloridazon	1698-60-8	INERIS (2009)	4	
Quinoxifen	124495-18-7	E.C. (2013) + INERIS (2011)	4	
Rimsulfuron	122931-48-0	INERIS (2011)	4	
Sulcotrione	99105-77-8	INERIS (2011)	4	
Tetrachloroethane-1,1,2,2	79-34-5	INERIS (2013)	4	
Tetraconazole	112281-77-3	INERIS (2011)	4	
Thiabendazole	148-79-8	JORF2015	4	
Toluene	108-88-3	JORF2015 + INERIS (2009)	4	
Triazole-1,2,4	288-88-0	INERIS (2015)	4	
Trichloroethane -1,1,2	79-00-5	INERIS (2013)	4	
Trichlorophenol-2,4,5	95-95-4	INERIS (2012)	4	
Trichlorotrifluoroethane-1,1,2	76-13-1	INERIS (2013)	4	
Triclopyr	55335-06-3	INERIS (2011)	4	
Xylenes	1330-20-7	JORF2015 + INERIS (2009)	4	