Environment Agency 22/04/98

ENVIRONMENT AGENCY Consultative Report -

Endocrine-disrupting substances in the environment: What should be done?

Having read through this consultative report and also three other publications -

1. Hormone Disruption in Wildlife ENVIRONMENT AGENCY HO-1/98

2. ENDOCRINE-DISRUPTING SUBSTANCES IN WILDLIFE -A review of the scientific evidence and strategic response - ENVIRONMENT AGENCY
Publication No: - HO-11/97 100-B-BANP and

3. The identification and Assessment of Oestrogenic Substances in Sewage Treatment Works Effluents, ENVIRONMENT AGENCY, 1997. ISBN 0113101244

We have the following comments to make.

Introduction:
A considerable amount of very useful work has been carried out on this topic but it has not been well co-ordinated and is lacking positive direction. Endocrine disruption is a very broad subject with an extremely wide range of variables - e.g. > 20,000 compounds have been listed as endocrine disrupters; temperature, state of sexual maturity of fish - and there must be some targeting of any future work to ensure that resources are used to the best advantage. At present, some of the results present a very interesting academic exercise without really getting to the heart of the problem or putting forward proposals for its solution.

We would like to suggest the following approach:

- A careful review of all the investigations carried out to date -It appears that many of the answers already exist.
- A database needs to be established - by EA?
- Drawing up a listing of the potency of endocrine disrupting substances
e.g. from some of the results quoted –

Ethinyl oestradiol	10 - 100
1 7~~ Oestradiol	1
Qestrone	0.1
Nonyl phenol	0.0001

Although limited, these results would indicate that undue emphasis 'has been placed on industrial rather than "domestic" sources - perhaps due to the larger quantities found for the former and the difficulties in detecting the latter at very low concentrations. This in turn leads to:
- Development of improved analytical techniques.
- An epidemiological study

In view of the very wide range of substances that could be involved, both singly and in admixture, it would not be practical to test each individually. It is surprising therefore that an epidemiological study has not yet been carried out. I believe that this should be at the top of the list of any future studies. In view of some of the findings, this should concentrate on feminisation of fish, low sperm counts and any deformities. This would then highlight areas where effects could be from "natural" or man-made substances. This could be extended to include those areas outside the UK where, in theory, contraceptive pills – largely containing ethinyl-oestradiol and HRT are less likely to be in evidence.

Once having established the cause(s) of the problems, these then need to be addressed -

- Reduction of **ALL** endocrine disrupting substances at source
- Could the materials be used more efficiently at source to avoid them getting into the waste stream?

- Are there alternative, less oestrogenic materials that could be used in their stead?

- Are there more efficient ways of destroying these materials that could be employed at STWs? - longer treatment times, treatment with chlorine, ultra violet light, passage through reed beds?

- Can more efficient method of mixing be used to ensure efficient dilution from the STW?

- Fish have the capacity of ingesting and absorbing oestrogenic substances. Is this concentration-dependent or will the fish continue to concentrate the oestrogenic materials themselves? If the studies with caged fish could be extended to include results for varying distances from the STW discharge pipes, it would give some indication.

- There should be careful control on the introduction of all new compounds and materials to attempt to minimise the wider effects that they may have. Oestrogenic potency should be amongst the control tests employed. All new medical products, in theory, already undergo stringent testing. The same should be applied to other products. This applies particularly to steroids / hormones that could be artificially added to the system from 'medication" and foodstuffs - e.g. the addition of hormones to animal feedstuffs and the recent introduction of "Sheila bread" being into the UK. Although the latter might be beneficial to reduce the ill-effects of the menopause it does seem that it will also introduce an excessive amount of oestrogens into the environment.

- From the results seen to date, it does appear that it would be prudent to treat all sewage thoroughly at the STW and preferably discharge the final effluent via long pipelines into tidal waters.

With regard to **specific points:**

- The results in Box B are poorly presented - what chemicals were present?

- Table 2 would be more meaningful if substances were listed in order of potency and limits of detection. As already recognised, we are dealing with a very wide range of products and need to hit the most potent first.

5.1

- The section on PCBs is really too detailed. As above, a broad-brush approach needs to be adopted first.

- Whilst agreeing that alternatives to TBTO as antifouling agent should be a high priority are marine molluscs really wanted in dockyards?

- Steroids – Were the fish quoted really absent in the rivers tested?

5.2

- Whilst agreeing that industry should be playing their part in developing alternative, lower-toxicity products, this will mean a great deal of development and testing of any new product to avoid more harmful effects being introduced. From the results to date, it is the removal, replacement of "domestic" products that will have the greatest effect. In the first instance, industry should concentrate on minimising any waste product and destroying any that can not be avoided in treatment tanks before release.

- The water industry should concentrate on ascertaining the sources of the endocrine disrupters and, with the help of the Agency, reducing permitted release levels. The water industry should then investigate methods of removal or destruction of any remaining disrupters.

- As a corollary to the above, and in answer to the question not asked, the cause of "domestic" releases should be investigated and the release reduced.

5.3

- Agree the need for good screening tests. This should be followed by establishing an order of potency and the establishment of a target list.

5.4

- As above. The Agency does seem to be set on investigating the effects of release from industry. From the results to date, it would seem that the greatest contribution that industry could make would be to find a less potent replacement for ethinyl oestradiol.

5.5
Specific priorities:

- Agree the first 5
- 6 - Any biological methods should be related to chemical present.
- 8 - agree high priority
- 10 - as above
- *Research priorities* - as *list given in introduction to these comments*

6 CONCLUSION

- See comments on Table 2- above
- 2,3,5,9 - Minimise all releases
- 4,6 - as above, target "domestic" and that industry serving it.
- 7 - add pharmaceuticals and foodstuffs
- 8 - targeting essential
- 10 - this should be targeted - as suggested in the introduction
- Research must be targeted and pragmatic.
- Document actions commented on. Others in introduction.
- Don't necessarily reinvent the wheel. Look at other existing technologies.
- As introduction. Again, must emphasise the need for targeting and co-ordination.

In Summary:
We would recommend the following programme of work -

- Carefully review all work on this topic to date.
- Produce a table of endocrine disruption potencies
- Perform an epidemiological study
- Concentrate efforts on most potent materials
- Establish an approvals scheme for all new materials that might enter the chain.
- Develop more sensitive analytical methods
- Initiate study on break down of endocrine disrupters
- Initiate study on improved treatment at STWs
- Investigate improved mixing of effluent from STWs