Together Against Sizewell C

ISH10: COMMENTS ON MARINE ECOLOGY DOCUMENTS ISSUED AT DEADLINE 6

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The ***9.70 Evaluation of chlorination dosing option for Sizewell C*** **EN010012 [REP6-031]** published August 2021 describes a series of important modifications to the design of Sizewell C which will have important impacts on marine species . Key points are itemised and discussed below.

1. Hinkley C has been designed with an LVSE intake which is claimed to minimise fish ingress because of the low intake water velocity and how it is orientated with respect to the tidal flow. It has now been decided that a modified version of this design will be used at Sizewell C. The modified design is simplified with the removal of internal baffles which it is hoped will reduce vulnerability to fouling and the need to chlorinate the intakes. As stated on p 28 para 9.2, "*Without these internal baffles, EDF Energy's engineers decided that these modified LVSE intakes would not require chlorination at the heads, thereby avoiding chlorinating the entire cooling water system.*" It was my understanding that the internal baffles in the intakes at Hinkley C were designed to orientate the flow of the water and reduce fish ingress. It is unclear why the same level of fish protection can be achieved at Sizewell C without the baffles. This needs to be explained.
2. We still have no clear rationale as to why the intake culverts, screens wells, drum and band screens and FRR system will not biofoul with mussels, tunicates etc. Risks from organisms such as starfish which can live in large numbers in unchlorinated culverts and can attach to and block screens seem not to have been understood as they are not discussed. Starfish attached to screens can be difficult to wash off.
3. At earlier hearings and in written submissions I have raised the issue that the fish return system and the travelling screens will biofoul. This was previously recognised and it was, at one stage, proposed to chlorinate the screens and the FRR system. As stated on p27 para 8d, "*In order to protect the drum screens and FRR system, chlorinate (sic) the drum and band*

screen wells but only in the growing season when seawater temperatures exceed 10 °C." An examination of cooling water intake temperatures at Sizewell B shows that the sea temperature (see Fig 1 below) exceeds 10 °C for a considerable proportion of each year and over most of the period when large numbers of fish are impinged. Further, if climate warming does occur as predicted then over the life of the proposed plant the proportion of the year with temperatures above 10 C will increase. The result is that the majority of fish returned to the sea via the FRR will have been exposed to chlorination should it be deployed. Chlorine is a broad-spectrum poison which is highly reactive and reacts with almost every constituent in natural waters, including made-made pollutants, yielding products having varying degrees of persistence and toxicity. It forms a wide range of organohalogenated compounds and chloramines depending upon the compounds present in the water. The total residual chlorine chronic toxicity threshold for aquatic life is 0.002 mg/l considerably below the proposed TRO of 0.2 mgl^{-1}. In Section 9 p 29, it is now stated that "*The successful conclusion of these studies means that the chlorination will not be applied before the SZC drum or band screens and that the subsequent addition of flushing water will not subsequently increase TRO levels within the FRR system (waste stream H)*." We are given no clear indication as to the nature of these studies which have reached this conclusion. However, the uncertainty is apparent because on p 29 it states that, "*In line with the strategy adopted at HPC, the chlorination dosing points in the screen wells before the drum and band screens will still be installed as a precaution but these would not be used unless there is a required change to the SZC chlorination strategy* ….". It is my view that it is inevitable that these dosing points will be used; if they are installed it is essential that their impact on the efficiency of the FRR is assessed. Operational experience at Marchwood Power Station has recently shown that chlorination in front of the screens and the FRR system was essential to control biofouling. It is of great importance to assess the impact of these dosing points before the plant is constructed, as the EA would be placed in an impossible position if asked to license their use after the investment has been made.

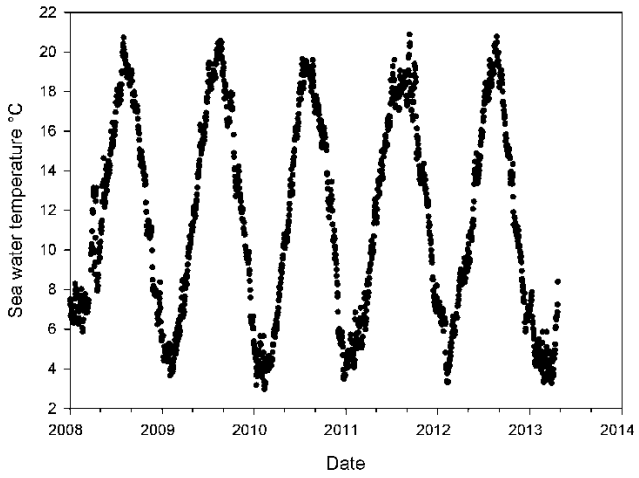

FIGURE 1 SEAWATER TEMPERATURE AT SIZEWELL AS MEASURED AT THE INTAKES OF SIZEWELL B.

The document **9.67 *Quantifying Uncertainty in Entrapment Prediction for Sizewell C* August 2021 EN010012 [REP6-028]** gives addition analysis of the impacts on fish caused by cooling water extraction. Key Points relating to this document are itemised below.

1. We are informed that (p 8), "*For marine fishes it is well established that populations can sustain annual losses of 10-20% or more of population size above natural mortality.*" This is a sweeping generalisation and clearly incorrect. For example, where is the evidence that long-lived low fecundity fish such as elasmobranchs, rays and sharks, can sustain such additional losses? Further, for many non-commercial species there have simply not been the studies to define what additional losses the populations can sustain. This foolish statement also ignores ecosystem level impacts if the power station takes an appreciable proportion of the same local population as has been lost to their predators such as larger fish, birds and diving mammals. Finally, many fish and other marine species have seriously depleted populations. It is certainly incorrect to believe that lamprey, smelt, twaite and allis shad can support any additional mortality without impacts upon their populations. Similarly, CEFAS has been active in the protection of bass populations from overfishing and anglers are restricted in the number of fish they can land, so why is it acceptable that power stations can kill so many fish given the constraints on others? A final point relates to the fact that all the arguments consider the impact of the proposed Sizewell C in isolation. The proposed plant will have an in-combination mortality impact with all the other EDF and other power company cooling water intakes killing fish along the English, Northern French, Belgium and Dutch coasts. If

CEFAS use huge population areas they should also consider the huge number of other intakes killing fish within these areas.

2. The calculations refer to both impingement and entrainment under the combined impact of entrapment losses. However, there is a major problem, in that CEFAS have no accurate estimates of small and long and thin fish which pass through the 10 mm screens of Sizewell B. This is because entrainment monitoring focused on estimating eggs and larval entrainment and used a pump sampler. This would not efficiently catch actively swimming small fish such as gobies, sand eel, juvenile lamprey etc. Therefore, the entrapment estimates are a serious underestimation.
3. At the core of the argument presented for commercial fish is that the adult equivalent value of the predicted catch will be a small proportion of the total population impacted. This argument is therefore very sensitive to the extent of the population considered to be impacted. Herring is a particularly important example of the potential problems with this approach. Many of the herring caught at Sizewell are from the local Blackwater population. What we need to know is what proportion of this local population is impacted? According to Table 1 p 19 "*Consideration of potential effects on selected fish stocks at Sizewell*" the herring stock unit is ICES subareas 4 & divisions 3a, 7d, Skagerrak, Kattegat and Eastern Channel. The Blackwater herring are a spring spawning and has been managed as an independent stock. I can find no analysis of the impact upon this stock. The assertion that "*the weight of evidence therefore indicates that Sizewell impingement is from the main North Sea stock* " (section 2.3 p 27) seems more an assertion than a carefully argued analysis. The spawning condition of many impinged adult herring at Sizewell B would suggest they are from the spring spawning Blackwater stock. What is required is a morphometric analysis to demonstrate the majority are North Sea stock before this assumption can be accepted. Similar arguments relating to local population could be made for other species, for example smelt. It is unclear whether the cucumber smelt caught at Sizewell are only derived from the East Anglian/ Thames River systems. CEFAS in Table 1 state that the population includes the European coast from the Elbe to the Scheldt without any proof.
4. When it comes to species of conservation concern it is simply unacceptable to assert that Sizewell C will not kill a large proportion of the population. If this approach to the killing of eels and shad was taken by every organisation extracting water, the populations would surely die out. Sizewell C is predicted to catch a large number of late juvenile and adult shad: this is unacceptable. Additionally, with eel and lamprey, because small individuals will penetrate the 10 mm screen mesh of Sizewell B, there are not even reliable data on the

number killed by the B station and therefore no reliable estimates for the proposed C station. For these protected species this lack of reliable data is unacceptable. It is impossible to quantify the uncertainty without reliable data.

An outline of the impingement and entrainment monitoring plan is given in En010012. The main area of weakness relates to the sampling of small and long-thin fish which will pass across the 10 mm travelling screens. These will not be adequately sampled by entrainment monitoring based on a pump sampler system because actively swimming fish can avoid capture. This is important as it is stated that the primary focus will be on ichthyoplankton and **juvenile** life-history stages. CEFAS need to explain how a pumped sampler will efficiently sample juvenile life stages. There is also a need for consideration of adult fish species that are entrained rather than impinged. These include pipefish, sand gobies, transparent goby, butterfish, viviparous blenny, 3-spined stickleback etc. There appears to be a CEFAS policy to ignore small adult fish which are entrained rather than impinged. There are strong grounds to believe that the numbers of species such as Nilsson's pipefish and sand goby species entrained are huge and of appreciable ecological significance.