



National  
Qualifications  
2023

**X826/76/11**

**Environmental Science  
Paper 1 — Supplementary source booklet**

TUESDAY, 30 MAY

9:00 AM – 9:45 AM

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**Supplementary sources of information**

**Source A** is a diagram showing the Beatrice Oil Field complex, and its location in the Moray Firth.

**Source B** is a sketch map showing designated marine conservation areas in the Moray Firth.

**Source C** is a table displaying conservation designations for protection of the marine environment in the Moray Firth.

**Source D** includes facts about the marine environment around the Beatrice Oil Field complex.

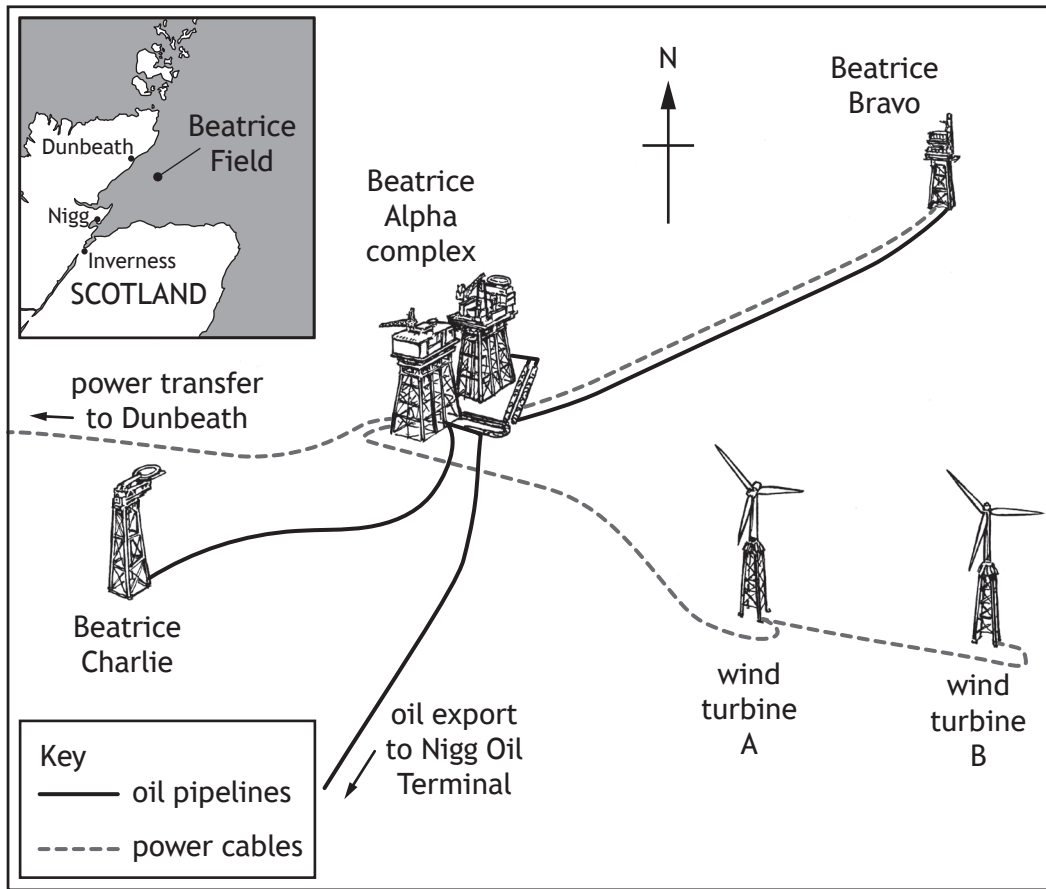
**Source E** is an image of drill cuttings viewed under a microscope.

**Source F** is a table displaying benefits and challenges of two methods commonly used for dismantling oil platforms.

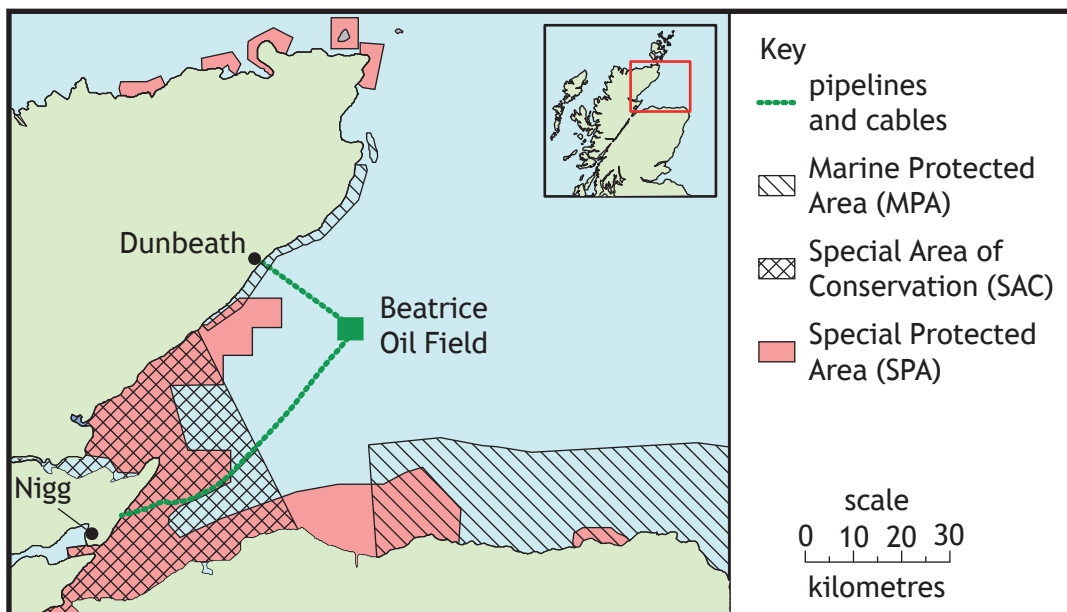


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Source A Diagram showing the Beatrice Oil Field complex, and its location in the Moray Firth



Source B Sketch map showing designated marine conservation areas in the Moray Firth



**Source C** Conservation designations for protection of the marine environment in the Moray Firth

Designation	Protected species and habitats in the Moray Firth
Marine Protected Area (MPA)	<ul style="list-style-type: none"> <li>• bottlenose dolphin (<i>Tursiops truncatus</i>)</li> <li>• edible clam (<i>Arctica islandica</i>)</li> <li>• sandbanks covered by seawater all the time</li> <li>• seafloor sediments and reefs</li> </ul>
Special Area of Conservation (SAC)	<ul style="list-style-type: none"> <li>• bottlenose dolphin (<i>Tursiops truncatus</i>)</li> <li>• sandbanks covered by seawater all the time</li> <li>• vegetation on stony banks</li> <li>• salt meadow</li> <li>• shifting dunes</li> </ul>
Special Protected Area (SPA)	<ul style="list-style-type: none"> <li>• intertidal mudflats</li> <li>• saltmarsh</li> <li>• plants and invertebrates that are important food sources for large numbers of wintering and migratory geese, ducks and waders</li> </ul>

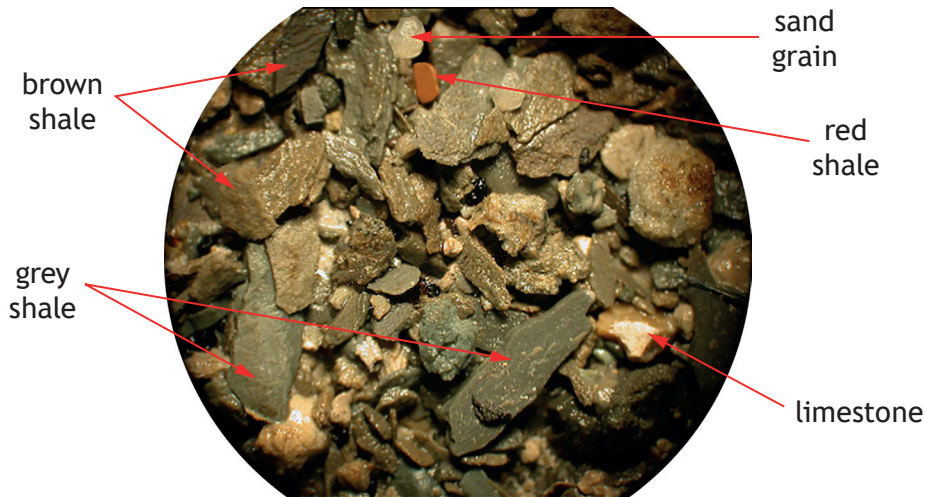
**Source D** Facts about the marine environment around the Beatrice Oil Field complex

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| <ul style="list-style-type: none"> <li>• Seabed sediments are typically sand and gravel, ranging from fine sand to muddy and mixed gravel to muddy sand.</li> <li>• The Beatrice production complex is located outside environmentally sensitive areas, but the oil export pipeline to Nigg and the power cable to Dunbeath both pass through protected areas.</li> <li>• Fish and seabed organisms in the area are typical of the Central North Sea. Some individual species are protected by legislation, such as the edible clam, Atlantic salmon, sea lamprey, marine turtles, and basking shark.</li> <li>• Marine mammals present in the area include cetaceans (porpoises, dolphins and whales), seals, and otters. Some of these are protected by legislation.</li> <li>• Users of the marine environment in this area include commercial fishermen, cruise liners, recreational sailors, wildlife cruise operators, renewable energy companies, an oil and gas platform decommissioning yard, and ferries.</li> </ul> |
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[Turn over

**Source E** An image of drill cuttings viewed under a microscope

Drill cuttings are shards of rock removed from a bore hole during drilling. In earlier days of oil production, it was usual to leave the cuttings on the seabed. These can be left in place after decommissioning providing they will not be disturbed in the future as this could release residual oil and toxic compounds.



**Source F** Benefits and challenges of two methods commonly used for dismantling oil platforms

Method	Benefits and challenges		
	Social	Economic	Environmental
<p><b>Explosives</b> Charges attached to platform legs between 5 to 8 metres below the seabed break the attachment</p>	<ul style="list-style-type: none"> <li>Requires a small team of explosives experts and divers</li> <li>Safety concerns over handling explosives</li> <li>Restricted access for other marine users during blasting</li> </ul>	<ul style="list-style-type: none"> <li>Low cost</li> <li>Fast results</li> <li>Platform can be raised to the surface as a single piece for transportation onshore for disposal</li> </ul>	<ul style="list-style-type: none"> <li>Produces shockwaves and acoustic energy that can kill or harm marine species</li> </ul>
<p><b>Mechanical</b> Use of abrasive water jets, sand cutters and diamond saws to cut the structure into sections</p>	<ul style="list-style-type: none"> <li>Requires a larger crew of personnel, including divers, plus support vessels</li> <li>Risk to divers' lives</li> <li>Restricted access for other marine users during removal</li> </ul>	<ul style="list-style-type: none"> <li>High cost</li> <li>Slow process</li> <li>Platform must be removed in sections, then shipped onshore for disposal</li> </ul>	<ul style="list-style-type: none"> <li>Cutting from inside the platform legs does not require dredging of the seafloor or cause disturbance of cuttings piles</li> <li>Cutting from outside would require dredging of the seabed</li> </ul>

[END OF SUPPLEMENTARY SOURCE BOOKLET]