

Web-only Appendix

NAEI maps were downloaded from www.naei.org.uk/mapping. These large files (8.701 MB) were captured by right-click and stored as bitmap files (e.g. benzene.bmp). They were accessed using MS-PAINT and unwanted zones such as Northern Ireland and North-Sea oil-platforms were edited out. The *.bmp files were assigned within a PASCAL program as 'file of byte'. Reversible algorithms were devised for converting map-references to pixel row/column numbers and to file byte-numbers. Grid-lines were computed and drawn onto the displays and the accuracy of the algorithms confirmed against Ordnance Survey (OS) maps.

File structure of 'file of byte'.

Bytes 0..1077 contain formatting parameters including 256 sets of colour-intensity codes, referred to subsequently through their sequence-numbers 0..255. Each of these sets consists of 4 bytes including 3 intensity-values for BGR, each value represented on a 0..255 scale: followed by a zero. For example, 0 0 0 0 is black and its sequence number is 0; 255 255 255 0 is white and its sequence number is 255; 0 0 255 0 is red and its sequence-number is 249.

The initial parameters and intensity-codes occupy bytes 0..1077 and the map pixel-values start at byte 1078. Each pixel-value is a single byte referring to a BGR sequence number. Successive map pixel-values are arranged from south to north and from west to east in rows of 2480 bytes. Calculations of file byte-numbers for pixel-east and pixel-north, and the reverse operation are as follows.

```
function bytenumber(pixe,pixn:integer):longint;
{*converts pixel easting (pixe-range = 0..2479) and pixel northing (pixn
0..3495 ) to file byte-number. linelen and starter are global integers pre-set to
2480 and 1078 respectively *}
var pe,pn:longint;
begin  pe:=pixe; pn:=pixn;
      bytenumber:=starter+pn*(linelen)+pe;
end;

procedure pixeandn(pixno:longint; var pixe,pixn:integer);
{*reverse of bytenumber; gives pixn and pixe from byte-number in pixno*}
var n,nn:longint; {*longint is a double-precision integer-variable*}
begin n:=pixno-starter; pixn:=n div linelen;
      n:=pixn;      nn:=n*linelen+starter;
      n:=pixno-nn;      pixe:=n;
end;
```

Parameters for inter-conversion of pixel easting/northing and grid easting/northing were found by identifying localised map-features such as islands and promontaries. Grid-north zero corresponds with pixel-north 221; Grid-east zero with pixel-east 234. The scale correspondence is 2.4224 pixels per km. This is equivalent to 412.81 metres per pixel.

Conversion procedures are as follows.

```
procedure gridtopix(gridn:double; var pixe,pixn:integer);
{*finds pixel-frame-numbers of grid-refs. nbase is preset to 221.
  ebase is 234; scale is 412.81*}
begin
  pixn:=nbase+trunc(gridn*scale);
  pixe:=ebase+trunc(gridn*scale);
end;
```

```
procedure pixtograd(pixe,pixn:integer; var gride,gridn:double);
{*finds grid-ref of pixel-frame-numbers : reverse of gridtopix *}
var pn,pe:double; {*double precision real-value variables*}
begin
  pn:=pixn-nbase; gridn:=pn*scale;
  pe:=pixe-ebase; gride:=pe*scale;
end;
```

Colour-sequence values correspond with emission-scale values 1 to 8 are as follows. Multiple codes 1..6 for individual scale-points specify the multi-colour hatchings used on the maps.

```
type
tscalecols=array[1..9,1..6]of byte;
const
scalecols:tscalecols=
  ((249,249,249,249,249,249),{*red          1*}
   ( 50, 56, 50, 56, 50, 56),{*orange-hatch 2*}
   (250,250,250,250,250,250),{*yellow-shades 3*}
   (251,251,251,251,251,251),{*green       4*}
   (254,254,254,254,254,254),{*light blue  5*}
   (205,211,217,205,211,217),{*blue-shades 6*}
   ( 4, 95,161,162,196,196),{*dark-blues  7*}
   (255,244,246,254,255,246),{*white-shades 8*}
   (0,0,0,0,0,0));          {*black      9*}
```

