

Cromarty Glass report

Discussion

The assemblage of glass from Cromarty 2013 totalled 1105 shards of which 196 are window shards. These were supplied in a total of 101 small find bags, individually numbered and containing anything from a single shard to a multiple thereof. In many respects the contents of this assemblage follows the typical make-up found on many Scottish sites and is closely related to the availability of glass at different periods in time. Study of glass assemblages from across the Scottish spectrum has revealed that glass does not become common until after 1700. There was limited use in Roman times and it was used very sparsely through the Dark Ages before being widely adopted for ecclesiastical windows from the 12th century onwards. Perhaps surprisingly it does not seem to have been used regularly for windows, even in the most prestigious secular structures, until the later 15th century.

There is as yet no evidence, documentary or physical, that glass was made from raw materials in Scotland before c1610 (**Turnbull 2001, 1**) which means that all earlier material was probably imported.

The expansion of the use of glass other than for windows occurred in the later 17th century with the advent of the ubiquitous wine bottle. The idea for these strong practical containers was introduced into England from Belgium around 1630 and they were being made at Leith by 1663. Initially they were expensive and 17th century examples are much rarer than later. However, by the second quarter of the 18th century they are common and found almost everywhere. They are generally described as wine bottles however many would have been for ale. A visitor to the Glasgow glass works in 1745 saw both being made but could 'hardly tell the difference'. (**Ibid 275**) Not only that but these useful containers would have been used for a variety of purposes beyond those they were originally intended for. While it is relatively straightforward to date the manufacture of these bottles their date of demise is less precise. Base rings often show heavy wear from years of repeated use.

By the end of the 18th century a greater variety of glass containers were coming into use and this continued through the 19th and into the present day.

Out of the total of 101 glass small finds bags from Cromarty, 61 were from context 5000, the overall topsoil spread. This is not surprising since the clay bonded structure foundations below that appear to pre-date the period of regular glass use possibly by some time. Glass vessels of 17th century or earlier date do turn up occasionally on Scottish sites but they are rare. A significant factor was that most medieval glass was potash fluxed which is very prone to corrosion and disintegration particularly in alkaline surroundings eg presence of lime mortar. In many cases medieval glass will have disintegrated beyond recognition.

Looking in more detail at the Cromarty assemblage the earliest glass is a few window glass shards. No vessel or bottle glass was identified as being earlier than the second half of the 17th century.

In addition to the wine bottles another relatively common category of bottle is represented by 4/5 shards in the assemblage. This is the case bottle, so-called because it was designed for multiple transportation in wooden cases. Normally originating in Holland or Germany the case bottle was square in section and made from cheap potash fluxed glass which corrodes readily. Case bottles were mainly used for the bulk transportation of spirits, eg gin, schnapps etc. The Cromarty examples appear to be mainly 18th century, one possibly late 17th.

There are a few shards of later bottles present but the main group indicates that the site was probably intensively occupied until the later 19th century.

The clear shards with enamel decoration from **SF778** are of interest. Again these are probably from an import, a spirit flask of German or Bohemian origin and probably date to the early 19th century (**Van den Bossche 275**). Interestingly Van den Bossche gives North Saxony as a possible manufacturing area for such vessels and there is of course the trade mark from Saxony on the vessel in **SF 203**.

29 further shards of clear vessel glass were recovered of which one was a rim shard from a probable storage jar.

The rest of the clear shards appear to be from finer table ware, stemmed drinking glasses and perhaps a couple of small tumblers. The diagnostic pieces reveal a date spread of around 1750 to 1830 with most probably 18th century. There are two shards with decorative internal stem twists which were a common feature in the 18th century. The technique was introduced about 1730 with the air twist, simply an elongated and twisted bubble(s). This became an opaque white glass feature and then a coloured feature before dropping quickly out of fashion around 1780.

The number of finer vessels represented indicates that the site had reasonable status in the 18th and early 19th century.

Twenty of the 196 window glass shards were selected for analysis by pXRF (portable x-ray fluorescence spectrometer). Sincere thanks are due to Historic Scotland (HS) for the use of this facility.

These samples covered the full range of window glass present based on appearance. Again the great majority derived from the general context 5000 and are not helpful for earlier stratigraphy but do emphasise the antiquity of the clay bonded structures.

English Heritage (EH) has been researching the relationship between window glass composition and date for several years. This has allowed a dating model to be constructed which identifies 8 different compositional groups between c1567 and the present day. (**Dungworth 2011, 2**).

This author, in conjunction with Historic Scotland's Technical Division, has been investigating the situation in Scotland to assess compatibility with the EH model. In general terms compatibility is quite good for window glass from c1700 onwards but earlier material has some differences. These are probably due to divergence in the origins of the glass whereas the later material followed parallel trends in manufacture.

The Cromarty samples resolved into 7 distinct groups as per the table below:

Glass type	Samples	Description	Date range
HLLA1	I, K*	High lime low alkali, high manganese	Pre 1600
HLLA2	T	High lime low alkali, low manganese	C1600-c1700
H/K	F, G, O, R	High lime low alkali, kelp mix	Late 17 th century
Kelp	A, B, C, E, L	Kelp fluxed, significant strontium	C1700-c1835
SS1	D, G, J, M, Q	Synthetic soda, 1 st generation, arsenic	C1835-c1870
SS2	H	Synthetic soda, 2 nd generation, no arsenic	C1870-c1930
Potash lead	N, P, S	High lead content, potassium flux, arsenic	Possibly 1835-1870

*Sample K just may be a wall shard from a medieval vessel/bottle, there is slight curvature to the edge but not enough survives to be sure, The composition is good for HLLA1 window

glass and the thickness might indicate a 15th century date rather than later, but this is rather speculative.

The earliest window glass at Cromarty is the HLLA1 which the EH dating model shows being introduced into England c1567 by immigrant glassmakers, many of whom were escaping the Huguenot persecutions on the Continent. Before this English window glass was made locally and its composition described as forest glass.

However, since Scotland had no indigenous production until c1610 (and no earlier forest tradition) then the HLLA1 glass would have been imported, possibly from England but more probably from the Continent. HLLA composition glass was developed in Germany in the 14th century and had spread to France by the 15th. This means that the imported HLLA1 glass found in Scotland could be considerably earlier than the c1567 threshold date given for England. It is therefore safer to simply date the HLLA1 glass to pre 1600.

HLLA2 glass with its lower manganese content is dated to c1600-c1700 by EH and can reasonably be assigned a similar date range for Scotland.

The H/K glass, an HLLA glass where kelp has been used for at least part of the fluxing alkali is not mentioned in the EH model and is increasingly looking like a Scottish variant. The clue is in the amount of strontium, double what is normally found in glass made with a land based plant alkali. Sir James Ord, one of the pioneers of the Scottish glass industry sought a monopoly on kelp production in 1621 and it may be that it was being used as the standard alkali considerably earlier than in England. Given the history of kelp production it is not unreasonable to date the H/K glass to the 17th century, probably the second half .

According to the EH model kelp became the standard source of fluxing alkali around 1700 and most 18th century window glass from Scottish sites conforms to that model.

SS1 and SS2 glasses used synthetic soda as the fluxing alkali and this composition became standard very soon after its introduction in the early 1830s. SS1 glass had arsenic added as a purge to assist in removing gas bubbles but this practice stopped about 1870, probably when tank furnaces with higher temperatures were introduced.

The last group present is not covered by the EH dating model and the composition contains around 20% lead and a significant potassium alkali. There is however also a significant marker of arsenic present which may indicate a date in the SS1 period, ie c1835-1870. It is likely that this was a special glass intended for use with furniture rather than with structural windows. Potash lead glass has a lower melting and working temperature than soda glass and is optically higher quality.

K R Murdoch September 2014

Works consulted

Ash D 1962 *How to Identify English Drinking Glasses and Decanters, 1680-1839*

London

Bickerton L 1971 *Eighteenth-Century English Drinking Glasses, South Brunswick and New*

York

Dungworth D 2011 *Walmer Castle, Deal, Kent, Analysis of Window Glass, English Heritage*
& Girbal B *Research Report Series no 2-2011.*

Turnbull J 2001
No 18, Society of

The Scottish Glass Industry 1610-1750, Monograph Series
Antiquaries of Scotland, Edinburgh

Van den Bossche W *Antique Glass Bottles, Their History and Evolution 1500-1850.*
Suffolk
2001

Catalogue

NOTES: The catalogue is in small find number order
References to parallels for drinking vessels appear against the appropriate item in the catalogue

Window glass numbers of and types in brackets after total shards.

Several abbreviations will be met with in the catalogue, the key is as follows:

BR Base ring
DV Drinking vessel
E Early
HLLA High lime low alkali window glass
L Late
M Mid
OD Outside diameter
WB Wine bottle
WG Window glass

- 30 TT104a Shards from 5 different bottles ranging from E to L19th c.
- 40 TT104b Shard mallet shaped WB c1730,
Shard with belling, slightly later
Further 18th c shard
- 41 TT104b Shard WG (1R)
- 48 TT106b WG shard, grozed edge, secondary surface (1T)
Tiny curved shard
- 56 Erosion s4 5 shards mid 18th c WB to mid 19th c beer
- 64 102 WG shard (1R)
- 93 TT201 Mixed bag mainly 19th c bottle shards but one E18th-L17th c WB shard plus a few
later 18th c
6 WG shards (1B, 3F, 2M)
Total 54
- 106 TT301 Very mixed bag of bottle shards (10) L17th to poss 20th c
- 107 erosion s4 2 shards WB, 1 prob early 18th c
Shard foot from drinking vessel, clear with light abrasion, diam c57mm.
Relatively
flat foot with pontil ground away.
1780-1830

- 189 5000 7 shards black glass, 2nd quarter to mid 19th c, one embossed Six 'to the ga'llon
- 190 5000 Part wine glass stem in clear. Facet cut bowl over merese and ball knob in turn over
 plain stem. Cut Regency flute. **(Ash 1962, 166)**
 1800-1830
- bowl Two shards domed foot from drinking vessel c57mm diam.
 Probably late 18th c
- Rim shard in clear from drinking vessel, some light corrosion. Bell or trumpet
 Mid 18th c?
- Further shard
- 191 5000 8 shards WB corroded, includes belling and case bottle shard, E – M 18th c.
- 192 5000 6 shards base WB dull green, moderate corrosion. One has glassgall (opaque grey
 18th c blue colour from excess sodium nitrate) belling, diam c100mm, second half
- 193 5000 3 shards aqua from two bottles with small pimple kicks, 2nd half 19th c
- 194 5000 Pale blue bottle pimple kick, mid to later 19th c
- 195 5000 Bottle base with pimple kick in pale copper blue, mid to later 19th c
- 196 5000 Unusual small bottle neck and lip in pale dull green, no appreciable corrosion.
 The
 been
 over lip slightly waisted neck is terminated by a poorly applied flat string ring/lip which resolves into two separate trails. The body shape of the bottle looks to have flattened. Surviving height 42mm, minimum OD of neck 12.3mm, diameter 20-22.5mm, aperture 8.5mm.
 Probably L18th-E19th c, continental import?
- 197 5000 17 shards black glass wine and beer bottle, E – M 19th c
- 198 5000 3 shards WG (1A, 1E, 1M)
- 199 5000 3 shards wB prob 18th c
- 200 5000 Shard 20th c lemonade? Bottle
- 201 5000 Shard WB, curvature would suggest 1st quarter 18th c, corrosion later!
- 202 5000 Shard square bottle base, L19th c
- 203 5000 Wall shard from drinking vessel/bottle? clear, etched with a trade mark of a Gauntlet plus lettering 'MADE IN SAXONY' and 'FIR----' Since lettering is in English

this was probably made for the British market.
Probably 19th c, before the unification of Germany in 1870.

- | | | |
|------|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 205 | 5000 | 3 shards WG including crown edge (2C, 1D) |
| 206 | 5000 | 2 x 19 th c bottle shards |
| 206? | 5000 | Shard bottle, prob E 20th c |
| 207 | 5000 | Abraded bottle shard, prob 19 th c |
| 208 | 5000 | 2 19 th c bottle shards
WG shard from near crown centre? (2B) |
| 209 | 5000 | Black shard mid 19 th c |
| 210 | 5000 | 3 lip shards brown bottle external screw thread, 20 th c |
| 211 | 5000 | Shard WG, patterned rolled plate, L 19 th c |
| 214 | 5000 | Two shards bottle pale aqua, L19th c |
| 219 | 5000 | Predominantly black glass beer and slightly paler bottle glass, mid to later 19 th c

3 shards pot
Total 95 glass |
| 220 | 5000 | Part bowl and stem in abraded clear from wine glass. Probable square bucket bowl

and stem with bladed knop. (ASH 1962, 134, fig 27c)
1780-1800 |
| 222 | 5000 | Unusual base shard in clear, some light corrosion, small tumbler or bottle.
Wear on

base ring with nicely shaped pontil mark with central pimple
Mid 19 th c? |
| 229 | 5000 | 20 various bottle shards, pale aqua, mid to L19th c
6 WG shards (1B, 3C, 2Q) |
| 231 | 5000 | 25 mainly small WG shards (3A, 3B, 2C, 1G, 1J, 7M, 8N)
3 small shards bottle, L19th c
5 small shards DV |
| 232 | 5000 | 15 small shards WB, corroded, Prob M – L 18 th c, one may be earlier |
| 233 | 5000 | 11 shards WB, corroded, mainly late 18 th c but two early, may even be 17 th c. |
| 234 | 5000 | Mixed bag mainly 19 th c bottles, possibly also L18th and 20 th .
6 WG shards (1A, 2B, 1F, 2M) |
| 235 | 5000 | 10 shards mostly medicine, pale copper blue and cobalt blue, L19th c |
| 248 | 5000 | Part stem from wine glass in clear, light abrasion, some white corrosion. Multi spiral |

- 25.5 air twist (MSAT) with two knops surviving. Height 50mm, diameter 13mm and over the knops. C1750 (**Bickerton 1971, pl 322-328**)
- 252 5000 6 bottle shards, mid 19th c
1 WB shard, L18th c
- 280 5043 Lip shard bottle, mid 19th c
- 281 5000 13 shards 19th c bottles, 3 shards WG (1B, 1C, 1I)
- 282 5000 4 shards WB from prob 2 bottles , one dark green with light corrosion, diam c90mm,
belling, L18th-E19th c
2 further shards moderate corrosion, belling, mid to later 18th c
- 292 5000 Two shards clear, slightly abraded, from parallel sided tube, quite thin,
possible
chimney section from lamp glass
probably 19th c.
- 294 5000 WB shard, heavy corrosion, E 18th poss L 17th c
- 298 5000 Lower body shard very rounded WB, heavy brown corrosion, E18th possibly
L17th c
Further shard
- 308 5000 2 shards WB, very pale green, heavy corrosion, prob L17th c
- 311 5105 Small shard stem from drinking vessel with internal decoration of 12 ply spiral
outside a pair of spiral tapes. (**Bickerton 1971, pl 415-425**)
C1765.
Part body from bell shaped bowl from drinking vessel, clear, abraded some
light
Corrosion
Probably mid 18th c
Rim shard from wide mouthed vessel (jar?), diameter over rim c90mm
- 342 5000 28 shards WB abraded or corroded, including base from probable mallet
shaped
bottle, c1730, diam 140mm.
Pre 1760 lip
Two further lips one possibly E19th c
Wall shards case bottle prob 18th c
- 352 5000 Part bowl from drinking vessel in clear, moderate white corrosion, original
diam
c63mm
Probably mid 18th c
- 372 5000 16 shards WB mid dull green, moderate to heavy corrosion, diam of one
c120mm,
belling, mid 18th c

- 380 5000 Mixed bag L18th – L19th c bottles
Shard clear DV
7 small shards WG (6B, 1E)
- 381 5000 7 shards WB dull green moderate corrosion, orig diam c100mm, 2nd half 18th c
- 390 5000 Very mixed bag including 3 possible L17th c shards (1 x case bottle, 2x WB)
9 early 18th c
4 19th c
7 WG shards (2B, 1E, 2H, 1K, 1L)
Late greenglaze potsherd
Total glass 27
- 392 5000 64 shards E to mid 19th c WB shards including 2 bases with slight bellling in black
glass (E19th c) all relatively uncorroded. 2 lips one early 19th c one mid.
19 shards WB moderate corrosion, 18th c
Small shard DV clear, prob 18th c
10 shards WG (4C, 2E, 4O)
Total 90
- 397 5000 A very mixed bag of probable 18th to late 19th c.
Including mid 19th c bottle shards and earlier wine bottles corroded.
Base of 'egg' bottle with pontil scar (mid 19th c)
Pale blue bottle late 19th c
Wall shard drinking glass with white corrosion.
18 WG shards (5A, 4B, 2C, 4M, 2N, 1O)
2 opaque turquoise shards L19th c
Clear medicine phial lip, L19th/E20th c
Base from case bottle probably 18th c.
Total 112 shards
- 419 5000 Part shoulder, neck and lip from square section bottle in firebright pale olive green.
Neck height 19mm, flattened applied lip, external diameter 33.5mm. aperture 22mm. Possible storage or case bottle, condition would indicate no earlier than
E19th c
- 420 5000 7 shards WG (5A, 2F)
- 421 5000 Cobalt blue medicine shard embossed 'ake', probably 'not to be taken' L19th –
E20th c
- 425 5000 Shard WB base ring, heavy corrosion, prob L17thc
Second shard similar corrosion
- 459 5018 shard WB base prob L18th c
- 466 5150 base shard from fairly large diam WB, first half 18th c possibly early.

- 481 5148 Base WB c105mm diam, dull mid green, belling, moderate corrosion, mid 18th c
 Shard of WB base, moderate curve through BR, moderate to heavy corrosion, E18th c.
 Further shard
- 489 5007 Potsherd
- 499 5000 34 various bottle shards, dark to black, some with belling, E – L19th c
- 500 5000 7 various bottle shards pale green L 19th c
 Possible lamp glass, clear
 Tiny shard embossed shoulder L 19th c
 5 shards WG (1A, 2C, 1M, 1Q)
- 506 5000 Mixed bag including bottle shards from L17th c (2), 18th c (17), E-M 19th c (7)
 2 shards DV bowl 18th c?
 3 shards WG (1A, 1B, 1P)
 Shard possible case bottle, heavily corroded, 18th poss L17th c
- 772 5000 Mixed bag probably L18th – 19th c bottle shards (10),
 6 shards WG (4B, 1C, 1I)
- 773 5151 Late 19th c bottle shard
 Shard WG (1E)
 Further shard
- 774 5005 3 L18th c WB shards, 1 small L19th
- 775 5171 3 shards WB prob mid 18th c
- 776 5148 3 shards WB with very similar corrosion comprising
 Short splayed neck L 17th – E 18th c
 Neatly tooled neck and lip, string ring 8-9mm below lip, 2nd half 17th c.
 Further shard
- 777 5000 Mixed bag, 1 x E18th c WB shard
 3 later 18th c
 14 19th c bottle shards
 6 WG shards, one with crown edge (4A, 2B)
 Potsherd
- 778 5087 9 shards bottle, dark glass, mid 19th c
 2 small shards 'egg' bottle, 19th c
 Part base from tumbler in clear, heavy base ring wear
 Two small shards from curved vessel/bottle/ in clear with white, green, black,
 pale
 and dark blue enamel decoration. Just possible North German spirit flask
 Early 19th c.
- 779 5087 Shard WG (1R)
- 780 5010 WB shard mid to late 18th c
- 781 5116 4 19th c bottle shards

- 4 WG shards, one with heat sealed edge (2A, 1N, 1R)
- 782 5087 12 shards WB, mid 18th c
Shard WG (1F)
- 783 5121 6 bottle shards, 4 mid 19th, 2 x 18thc
- 784 5154 19th c bottle shard
2 WG shards (1E, 1F)
- 785 5147 21 WB shards, varying corrosion, no beelling early 18th c, some poss L17th.
Intrusive? uncorroded square bottle base plus part base from E19th c WB
- 786 5133 3 shards bottle, 2 x mid 19th c, one prob L18th
- 787 5158 5 shards WB, corroded, mid to late 18th c
Shard egg bottle, mid to late 19th c
- 788 5000 3 shards bottle, 19th c
Shard WB, L18th?
3 shards WG (1C, 1E, 1H)
- 789 5000 Very mixed bag ranging from L17th – E18th c WB shard to possibly E20th c
10 shards WG (5B, 1E, 2F, 2J)
- 790 5007 5 shards WB, 18th c
Bottle shard, 19th c
WG shard (1B?)
Piece of stone
- 791 5034 2 shards WB, E 18th poss L17th c
- 792 5012 Shard pale blue bottle L19th – E20th c
- 793 5020 7 shard WB corroded, beelling, second half 18th c
6 shards WG (6R)
potsherd
- 794 5121 6 shards prob WB moderate to heavy corrosion, M-L 18th c
4 later shards, 19th and possibly 20th c
2 WG shards (1C, 1G)
- 795 5122 6 shards from later 18th c WB including enhanced lip
4 further shards from second bottle also 18th c
Bottle shard 19th c
Shard wall DV probably 18th c
Lip shard in black glass E19th c
14 shards WG (2E, 12R, 1S)
Bevelled WG 3.5mm thick (plate) probably 19th c
Total 30 shards
- 796 5000 14 WB shards, 2 poss L17thc through to L18th. 1 x 19th c shard
3 clear DV shards
12 WG shards (9A, 1E, 1F, 1G)

- 797 5105 10 various bottle shards, one/two prob E18th c
7 mid 19th c
1 L19th c
Shard DV
6 shards WG (1A, 2B, 2M, 1N?)
- 1233 5218 Small shard WG (1I), dark brown corrosion, 16th c poss earlier
- ? 5005 Body shard beer/ale bottle in black glass, mid 19th c
- 5000 5020? 2 shards WG (2R)
- ? 5148 Sondage 8. 8 shards WB, at least 2 L 17th – E 18th c, one prob mid 18th c