

# Water Use in Metal and Glass Recycling Workshops in Late Antiquity

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Water availability for glass and metal workshops in antiquity was essential, but how water was used in these workshops is rarely discussed. By the late and post-Roman periods, glass and metal working begins to appear in the former rooms of domestic or public buildings, and the predominant function of such workshops appears to be recycling older Roman objects and materials.<sup>1</sup>

One of the curious things about these late antique recycling workshops was their frequent location in or immediately adjacent to bath complexes and major water features. For example, the Crypta Balbi workshops of the 5<sup>th</sup>–9<sup>th</sup> century were located in the former late Roman latrines, and a metal workshop at Grumentum was adjacent to a fountain.<sup>2</sup> Chavarria Arnau documents that just under half (10 out of 22) of the villas in her catalogue with “productive changes” were found in the bath complexes.<sup>3</sup>

The use of water in metal and glass recycling workshops included, broadly, pre-washing materials to remove superficial finishes or dirt, quenching, the use of a damp cloth to aid in forming blown glass vessels, the control of kiln temperatures, and the washing of hands and tools. There were two types of water features preserved in these recycling workshops: tanks and drains/channels.

Four villa sites in Italy – Monte Gelato, Aiano-Torraccia di Chiusi, Santa Cristina in Caio and Faragola – provide some of our best evidence for mixed metal and glass recycling in the post-Roman phase. But the evidence at these sites for water use in the workshops is highly variable and appears to have responded to sites specifically – where there was close access to a spring or stream, perhaps there was no need to build new water channels. However, some general observations can be noted.

Firstly, in the rural environment, the water systems used in the villas always seem to have been out of use by the time any recycling operations commence. This is evident from the dating of backfilling of drains and cisterns. However, because water was still essential in these recycling operations, we observe two main responses to this: the first was to cut new tanks and water channels through former floors, under floors that had already been removed, and through walls. This is the case of Monte Gelato and Aiano-Torraccia di Chiusi, but also at other sites, like El Ruedo and San Felice. Sometimes these drains were rather sophisticated – at Monte Gelato drain E23 was a double channel drain, with a bottom channel covered by a tile sealed with mortar, and an upper channel open to the workshop.<sup>4</sup>

The other solution at villas is not evident archaeologically – where there were no obvious water channels or plaster lined tanks. In these cases, one must assume that they were using buckets or pits to hold water, presumably collected from nearby streams, springs, rainwater, or wells.

The choice of water solution does not necessarily correspond to the technological process used – for example, there was blacksmithing at Faragola, but no purpose built tank, while at Monte Gelato, a tank sat in the corner of the blacksmithing workshop. At Cesson-Sévigné, there was a glass blowing operation in the former baths of the villa, but no new water supply system put into place, while at Aiano-Torraccia di Chiusi water could have been used to pre-wash glass *tesserae* and finished moulded objects.<sup>5</sup> Thus it was not the material or kiln technology (heating of crucibles or forging) alone that dictated an established water provision. In general, I would argue that the investment in water provision that left an archaeological trace indicates the recycling of materials to make finished objects – tools, agricultural clamps, beads – not “raw” materials. It is also critical to note, however, that at Monte Gelato and San Felice there were also lime kilns used to make lime for mortar and concrete for on-site reconstructions. A significant amount of water was needed to make lime concrete, and thus these channels may have been primarily present to facilitate the slacking of the lime, and incidental to the metal- and glass-working.<sup>6</sup>

Finally, to return to the question of the relationship between these workshops and bath complexes. This relationship must be understood to be materially related, not water related. They were recycling the materials from the baths not its water supply.

### Notes

<sup>1</sup> In cities, recycling workshops appeared in the former latrines of Crypta Balbi in Rome (Ricci 2001, 336–350) and the baths at Sabratha in North Africa (Leone 2007, 216 f.). I have documented the phenomenon in Roman villas at sites across the Mediterranean regions (Munro 2012; Munro 2010), but this also occurred in Germanic provinces (see Van Ossel 1992) and Britain (for example at the Brading on the Isle of Wight).

<sup>2</sup> Bison et al. 2016, 79.

<sup>3</sup> Chavarria Arnau 2007, 126. See also Catalogue in this volume.

<sup>4</sup> Potter – King 1997, 59 f.

<sup>5</sup> Deltenre – Orlandi 2016; Cavalieri 2012.

<sup>6</sup> On lime concrete and water provision, see Martínez Jiménez, this volume.

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