Special Edition
Issues in South Australian
Anthropology and Archaeology

VOLUME 38 – DECEMBER 2014

EDITOR
Amy Roberts
The *Journal of the Anthropological Society of South Australia* is the official publication of the Anthropological Society of South Australia. It is a refereed journal that has been published since 1963. A list of recent peer reviewers can be found on the Society’s website [http://www.anthropologysocietysa.com](http://www.anthropologysocietysa.com). The journal primarily provides a forum for researchers of Indigenous Australian anthropology, archaeology, history and linguistics although broader topics related to all of these disciplines may also be included.

Contributions accepted include: articles (5000-8000 words), short reports (1000-3000 words), obituaries (500-2000 words), thesis abstracts (200-500 words) and book reviews (500-2000 words). Notes to contributors are available through the Society's website.

Should you wish to submit a paper to the journal please direct your enquiries to the secretary of the Anthropological Society of South Australia (current contact details can be found on the Society's website).

The journal is free for current members of the Anthropological Society of South Australia. Subscription application/renewal forms are also available through the Society's website.

**Anthropological Society of South Australia Committee**

President: Dr Keryn Walshe (South Australian Museum)
Secretary (Webmaster): Dr Amy Roberts (Flinders University)
Treasurer: Mr Tom Gara (Native Title Section – Crown Solicitor's Office – South Australia)
Councillor: Professor Peter Sutton (University of Adelaide/South Australian Museum)
Councillor: Dr Alice Gorman (Flinders University)
Councillor: Dr Janelle White (University of South Australia)

**Journal of the Anthropological Society of South Australia Editorial Advisory Board**

The Editorial Advisory Board consists of members the Anthropological Society of South Australia committee as well as the following specialists:

Professor Lester-Irabinna Rigney (Wilto Yerlo, University of Adelaide)
Professor Jane Lydon (University of Western Australia)
Dr Paul Monaghan (University of Adelaide)
Dr David Martin (Australian National University)
Dr Natalie Franklin (Flinders University/University of Queensland)
Professor Robert Layton (Durham University)
Professor George Nicholas (Simon Fraser University)
Dr Stephen Loring (Smithsonian Institution)

The views expressed in this journal are not necessarily those of the Anthropological Society of South Australia or the Editors.

© Anthropological Society of South Australia 2014

ISSN1034-4438
# TABLE OF CONTENTS

**Editorial**  
*Amy Roberts*  
ii

**ARTICLES**

Fighting Over the Heritage of South Australia's Great Salt Lakes  
*Kim McCaul*  
1

An Introduction to Earthen Mound Sites in South Australia  
*Craig Westell and Vivienne Wood*  
30

Some Signs and Markers Employed by the Adnyamathanha of the Northern Flinders Ranges, South Australia  
*Bob Ellis*  
66

Three Scales: GIS, GPS and Digital Site and Data Recording Technology in Archaeological Salvage at Olympic Dam in Arid South Australia  
*Marjorie Sullivan, Peter Hiscock and Philip Hughes*  
85

The Need to Have Understood Your Local Geology: Nature and Sources of Materials Used to Manufacture Stone Artefacts at Olympic Dam, South Australia  
*Philip Hughes, Marjorie Sullivan, Peter Hiscock and Angela Neyland*  
108

An Investigation of the Use of Australites (Tektites) at Olympic Dam, South Australia  
*Barbara Rowland*  
136

**SHORT REPORTS**

Filming at Cape Keerweer, Queensland, 1977  
*Peter Sutton*  
155
AN INVESTIGATION OF THE USE OF AUSTRALITES (TEKTITES) AT OLYMPIC DAM, SOUTH AUSTRALIA

Barbara Rowland¹

¹Huonbrook Environment & Heritage Pty Ltd, PO Box 97 Moruya, NSW 2537, Australia

Abstract

During archaeological survey and salvage at Olympic Dam (South Australia) and surrounding areas a number of intact tektites (also known as Australites) and flakes were discovered in open artefact scatters. Ethnographically, tektites have been recorded as having both an ideological significance and a use in the manufacture of flaked stone tools. A detailed review of the literature shows however, that very little is known about the utilisation of this unique material in an archaeological context. The dearth of material is compounded by the paucity of scientifically recorded finds and the collectable value of tektites to private and public collectors. Systematic plundering of both the general landscape and archaeological sites has contributed significantly to this issue; reliable provenance of archived assemblages and collections is in question and many smaller flakes have in the past been discarded in preference for the more commercially valuable and prized intact forms. The in situ finds in the Olympic Dam region therefore have the potential to augment the existing meagre understanding of the use of tektites across Australia and provide data on the general size and attributes of tektite flakes as well as the approaches of different tektite reduction events.
Introduction

Historically, tektites have been highly prized as curios and items of great collectability. The first recorded mention of tektites in Australia was in 1836 when Major Sir Thomas Mitchell presented Charles Darwin with a tektite that originated in the Murray Darling region (Bates 1924; Chalmers et al. 1976:1; Fenner 1938:82). This report includes a brief account of the origin of tektites, their morphology, chemical composition, age and location. It discusses the ethnographic and utilitarian significance that tektites had to the Aboriginal tribes prior to European contact and the collectability of these items post-contact. This is followed by a discussion of the archaeological finds of tektites at Olympic Dam and their significance for the region and for future research.

Tektites in Australia

Tektites, from the Greek word tektos (meaning molten), are small naturally occurring objects, similar in appearance to obsidian (volcanic glass). This similarity has resulted in them being named, amongst other things, ‘obsidian bombs’ in the past. This labelling however, is erroneous as they are not of volcanic origin, but rather result from meteorite impact and/or fallout. They are similar to obsidian, in being glass (molten silica cooled so quickly no crystals formed), but originated during gigantic meteorite or comet impacts, when myriads of sand grains and small rock fragments were melted and blasted into the upper atmosphere, from where they re-fused and descended to the surface as glass nodules.

There are four major strewnfields within the world, the largest being the Australasian strewnfield which encompasses China, South-east Asia and Australia (Chalmers et al. 1976:2; McNamara and Bevan 2001:8). In Australia these tektites are commonly known as australites and typically are small flanged pebble-sized objects (average size ~10mm-20mm), black in colour, translucent brown-green in thin section or fine flakes, similar in chemical composition (with silica (SiO₂) content averaging 76%), yet variable in morphology, with an excess of 30 different shapes having being described (McNamara and Bevan 2001:8–20).
The age of australites still appears to be contentious, with two disparate date ranges being offered; the first a date derived from fission track and potassium-argon dating (KAr) of between 700,000 and 860,000 BP and the second based on geological stratification which dates the fallout to some time in a wide age envelope of around 7,000 to 18,000 BP (see Chalmers et al. [1976] and McNamara and Bevan [2001] for a more comprehensive discussion).

Tens of thousands of australites have been identified and collected, with the majority of the find-sites being located in southern Australia below 25° latitude (Figure 1) (Baker 1957:20–21; Chalmers et al. 1976:13; Cleverly 1976:228; McNamara and Bevan 2001:14). Finds north of this line were thought traditionally to result from human transportation (through trade) or from having been deposited by emu (Dromaius novae-hollandiae) and the Australian bustard or bush turkey (Eupodotis australis) that had swallowed the glassy objects as gastroliths (gizzard stones). Ongoing mining exploration in the Kimberley area of Western Australia has however, identified substantial numbers of australites in the region (Fudali et al. 1991:153; McNamara and Bevan 2001:14–15). This disparity in finds from the traditional demarcation boundary may be as a result of environmental or taphonomic processes masking their visibility, or the inaccessibility of terrain meaning large areas of landsurface have not been examined, rather than tektite absence (Fudali et al. 1991:153; McNamara and Bevan 2001:15). This indicates the previous maps of their distribution defined the area too narrowly, with the extended boundary shown in Figure 1.

Olympic Dam lies at latitude 30°26’24”S and falls well within the recognised boundary of the australite strewnfield. Abundant australites have been found southeast of Olympic Dam around Lake Torrens, although australite finds in this region appear to vary considerably, with substantial numbers found on the northeast margin of Lake Torrens, and with dramatically fewer found on the western shores (Chalmers et al. 1976:4).
Ethnographic and Contemporary Accounts for the Use of Tektites

Through personal observation the desirability of tektites in the region is still current today, with tektites being avidly collected, modified into replica American arrowheads and sold as souvenirs. As a result of this ongoing interest tektites are highly valued for both private and public collections with many being housed in museums throughout the country and overseas. Close to Olympic Dam a large number of australites, including very large nodules, and with at least two of the samples exhibiting signs of flake removal, are on display in a private collection in Andamooka.

The desirability of tektites, however, is not a new phenomenon, with these small items being highly valued in the past by the Aboriginal people of the region and greater strewnfield. Ethnographic evidence suggests that these items not only have a utilitarian function, but were also prized for their supernatural properties (Baker 1957:1).
In 1957 Baker wrote extensively on the role that tektites played in Aboriginal culture. Significantly, they appear to have been highly prized by the 'clever men of the tribes' for their curative ability (medicine stones) and/or destructive nature (death pointers, punishment stones). In northeast South Australia among the Kokatha these australites were known as *mabanba* and were prized for their curative powers (Berndt and Berndt 1943/44:56–57). Additionally, in some Aboriginal cultures they were used selectively in the hunting of emus, deemed to aid in rainmaking ceremonies (rainmaking stones) and were highly prized as communication devices (message stones) (Baker 1957:1; Bates 1924; McNamara and Bevan 2001:27–28).

Ethnographic sources also recount the use of rock crystals and australites in the initiation ceremonies for those destined to be clever men. During 'spiritual' death the recipient was disembowelled and the entrails were replaced with sacred stones, which would provide the initiate with the source of power required for his vocation (Cowan 1985:4; Hamacher and Norris 2010:94; Hiscock 2013:4).

Tektites were also modified by Aboriginal groups and used in the manufacture of small flakes and/or retouched implements. The use of tektites as a raw material for the manufacture of flakes was not extensive. The size of the natural cores and the relative rarity of the material excluded high exploitation (Baker 1957:8); nevertheless ethnographic accounts report their use in the manufacture of weapons, ceremonial knives, small scrapers, cutting stones and in composite tools (Baker 1957:8, 14).

Baker also theorised that, owing to their intrinsic value as items of supernatural power and healing, only damaged or already fractured tektites were used in the manufacture of tools (Baker 1957:8). Walcott (1898:42) lends credence to this theory writing that the Aboriginal people of the western district in Victoria carried tektites as amulets and on occasion were known to break them up for use as spear barbs.

Akerman (1975) described the production of tektite implements in the western desert of Western Australia. Of 385 flakes studied, he identified 30 as exhibiting signs of intentional retouch and identified 17 backed artefacts, 12 micro adzes and 1 micro burin within the collections. Further examination of the
micro adzes revealed two distinct types, one a miniature version of the standard western desert adze and the second identified as an engraving tool known as a *Pitjuru-Pitjuru*, which traditional owners recounted that was used to etch designs on sacred objects (Akerman 1975:118).

Additionally, Cotterell and Kamminga (1987:677) posited that in the absence of an extensive obsidian source, tektites were collected, flaked and the small slivers utilised as surgical tools. This view was also held by Hamacher and Norris (2009:82) who wrote that “many Aboriginal groups had a number of uses for tektites, including surgical tools and implements used in ritual and ceremony.” Historically, artefacts made from australites have been classified as specialised tools/knives used in circumcision ceremonies (Baker 1957:14), but Akerman (1975:117) while acknowledging this supposition queried its validity, stating that this is “...an assumption that reflects more on the romantic nature of the finder than on the possible range of uses that the flake may have been subjected to.”

Unfortunately, it seems that as reported by Bates (1924) and Baker (1957:17), over time and as a result of European contact, the formerly symbolic and spiritually prized tektites became little more than commodities. They lost much of their intrinsic ideological and utilitarian value and became goods bartered to passing Europeans. Both Bates (1924) and Baker (1957:17) noted that along the transcontinental train route adults would trade one intact tektite for a shilling or a portion of tobacco while children traded one tektite for one sweet.

As noted above, the extensive collection of tektites since European contact has resulted in large numbers being held within private and public collections. The problem this causes for archaeologists is that many were removed from archaeological sites with little or no regard for provenance or the significance of their role in Aboriginal culture. Cleverly (1991) highlighted this issue by remarking that of approximately 40,000 australites known to his study, 39% had useful provenance while the remaining 61% had vague or no useful data.
Collectors are frequently individuals that work in remote areas and collect tektites for their curiosity value rather than for their scientific and anthropological merit. Large collections have been purchased from station owners by geological museums and institutions such as the Western Australian School of Mines (see Cleverly 1995). This wholesale collection of tektites for geological study, curiosity value and sale has resulted in selective removal of intact or near intact tektites, leaving fragments and/or flakes with no contextual reference to their natural deposition, knapping sequences and potential use.

**Archaeological Context of Tektite Finds at Olympic Dam**

Since 1980 an area of over 600 km$^2$ of the desert region around the Olympic Dam mine has been systematically surveyed and salvaged in preparation for the proposed mine expansion (Hughes et al. 2011). More than 17,800 archaeological sites, predominately artefact scatters, have been identified (Sullivan et al. 2014). Additionally, a small area near Wirrda Well approximately 20km southeast of the Olympic Dam survey area was also systematically surveyed for a separate infrastructure proposal in 2011. It is noteworthy that of these 17,800(+) sites only five sites (artefact scatters) in the Olympic Dam region and one artefact scatter (Wirrda Well) in the survey area to the southeast yielded tektite finds. Interestingly the five sites in the Olympic Dam area were all located in a loose cluster in the extreme northwest of the survey area adjacent to large ephemeral water sources (Figure 2).

**Table 1** Tektite finds in the Olympic Dam Region.

<table>
<thead>
<tr>
<th>Site Name</th>
<th>Number of Cores/Intact Tektites</th>
<th>Number of flakes/(flake scars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>H184</td>
<td>1 (unmodified tektite)</td>
<td>-</td>
</tr>
<tr>
<td>ODX_09786</td>
<td>1 (unmodified tektite)</td>
<td>-</td>
</tr>
<tr>
<td>ODX_09821</td>
<td>-</td>
<td>5</td>
</tr>
<tr>
<td>ODX_09823-ODX_09833</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>ODX_10499</td>
<td>1 (modified core)</td>
<td>6</td>
</tr>
<tr>
<td>Wirrda Well</td>
<td>1 (modified core)</td>
<td>(1)</td>
</tr>
</tbody>
</table>
Figure 2 Sites with tektites in NW corner of study area. Dune crest lines and pans (blue shaded areas) are shown.

Site Settings and Summary Descriptions

Site H184

In 1981, during early stages of the survey for the then-proposed Olympic Dam mine, an intact tektite was found in an artefact scatter on a site covering a prominent blowout in a dune on the southeastern margin of Red Lake, a very large pan about 15km west of the Olympic Dam study area. In 2013 when the site was re-surveyed it was measured as more extensive than originally recorded but otherwise similar, in a large oval-shaped blowout. It consists of a dense artefact scatter (100 artefacts/m$^2$) containing distinct knapping floors, retouched flakes and diagnostic implements with a range of raw materials but dominated by silcretes. One piece of red ochre was identified but unfortunately, size and any modification and/or grinding were not recorded.
Site Near Wirrda Well
During a 2011 survey of a region approximately 20km southeast of the Olympic Dam survey area a tektite core, approximately 20mm in diameter, was recovered in a medium-sized dense artefact scatter. The irregular-shaped site has a north-northwesterly aspect and is on the flank of a medium-sized dune, adjacent to a large water holding depression. The tektite core was found on the western margin of the main assemblage. The predominant raw material was silcrete with cherts and quartzites also present. A comprehensive search of the immediate area and adjacent sites on the dune revealed no further tektite flakes. The core itself had one flake struck from it, approximately 10 mm in length.

ODX_09786
Site ODX_09786 is a medium density (34 artefacts/m²) irregularly-shaped artefact scatter extending from the crest of the dune to the pan margin with knapping floors at the base of the dune and in the pan. The site is in the northwest of the survey area and is adjacent to the ODX_09823-ODX_09833 complex and ODX_09821, both of which yielded tektite flakes (Figure 2).

During the salvage phase two areas were gridded and artefacts collected. Silcrete is the dominant raw material with low proportions of quartzite, quartz, oolitic and local chert. Knapping floors of silcrete and crystal quartz were identified. Weathered rock identified in the field as ochre was collected, but the nodules were sandy weathered limestone and showed no sign of grinding or shaping for use as pigment, instead one piece appeared to have been used for smoothing or shaping wood.

One intact tektite, approximately 20mm in diameter, was found in the centre of the main grid. Retouched flakes and diagnostic tools were observed, including 26 backed artefacts, 9 tula slugs, 2 unifacial points and 162 other retouched pieces.
ODX_09821

Site ODX_09821 is situated on a sand sheet forming a peninsula projecting from a sand dune to the south and bounded by a pan to the east, a large pan to the west and a gibber surface to the north, with a small pan nestled between the large western pan and the northern gibber (Figure 2). The artefact scatter is irregular in shape and extends the entire length of the peninsula from the toe of the dune to the south into the pan to the west and the gibber to the north. ODX_09821 is part of a complex of dense artefact scatters that surround the large pan and include the ODX_09823-ODX_09833 complex and ODX_09786 (described above).

During the salvage phase 9294 artefacts were collected (6540 surface, 2754 subsurface) with a surface density of 32 artefacts/m². The predominant raw material is silcrete with quartzite, chert, cherty silcrete and quartz represented to a lesser degree. The assemblage also contained several unmodified limestone cobbles. A targeted surface collection to the north east of the main scatter resulted in the collection of four tektite flakes. Spatial proximity and raw material similarity suggests that this was a tektite knapping floor.

A comprehensive survey of the pans adjacent to the site (see Figure 5) revealed no further tektites but an additional tektite flake was found during differential GPS recording of the site. Its location was captured from GPS and the flake was collected. All five flakes were unretouched and had a total weight of 2.38g, three of the five flakes still had some residual cortex (Figure 3).

The five tektite flakes were brought together to be refitted (Figure 4). Three were conjoined with the remaining two likely to be from the same parent tektite owing to their similarity, close proximity on the site surface and the rarity of tektite flakes and knapping floors within the wider region.
Figure 3 Tektite flakes from targeted surface collection. Photograph by Barbara Rowland (HEH).

Figure 4 ODX_09821 tektite refit by Harrison Pitts indicating this was a relatively large near-spherical tektite. Photograph by Harrison Pitts.
**Figure 5** Extensive water-holding pans north of the site complex. Photograph courtesy of HEH.

**ODX_09823 and ODX_09833**

This composite site comprised two dense artefact scatters in adjacent blowouts on a high dune with large pans to its north and south and a smaller pan to the east, and was part of the northwest complex of dune and pan-margin sites which included ODX_09786 and ODX_09821 (Figure 2).

During the survey phase the artefact clusters were recorded as two separate sites, but salvage excavations determined that they were contiguous. The eastern blowout (ODX_09833) is large, deeply deflated and slopes to the south. The western blowout (ODX_09823) is a shallow deflated area on the crest of the dune. Both clusters of artefacts contained numerous implements reported during the survey stage, including several hundred backed artefacts in the surface scatter at ODX_09833. Both blowouts were dominated by a range of silcretes, and there was a wide variety of artefact and raw material types.

During excavation of the western blowout one small tektite flake (<10mm long and 0.33g) was recovered in Spit 8 at a depth of ~900mm below the surface. Subsequent OSL dating of this artefact layer returned a terminal Pleistocene date of 11.3–13.3 ka (Figure 6).
Figure 6 Schematic of dated layers at ODX_09823-ODX_09833 (from Hughes et al. in prep.)
**ODX_10499**

Site ODX_10499 was a moderately dense artefact scatter (20/m²) across most of a large shallow irregular blowout on a low dune in the northwest of the study area. The dune forms a lobe into a large canegrass swamp, and is bounded on its northeast, east and southeast by that swamp. The most abundant surface material was sandy-textured silcrete with lesser amounts of cherty silcrete, local chert, quartz and quartzite. Small numbers of implements and retouched flakes were noted and several hearths and pieces of heat-shattered rock were distributed through the site.

This is one of several similar sites in the area, selected for analysis because six tektite flakes and one tektite core were found together near a large grinding stone in a dense cluster of artefacts. Analysis of the tektite flakes and core showed that five of the seven fragments could be refitted with the remaining flakes likely to have come from the same nodule (Figure 7). Each piece was 10 mm or less in length and their total weight was 1.92 g. A considerable portion of the original tektite is missing. The largest of the missing flakes could not have been longer than 20 mm, based on the shape and size of the tektite indicated by the refit. The final core is part of this assemblage and could be used in further analyses.

*Figure 7* ODX_10499 Tektite refit by Harrison Pitts. Photograph by Harrison Pitts.
The Harris Matrix (Figure 8) below shows the reconstructed reduction sequence. Harrison Pitts (in prep.) has used the Harris (1975) stratigraphic recording method to devise a system for recording reduction sequences, which is used to describe the sequence here. Flake 12476 (an incomplete marginal fragment) was almost certainly struck first; several other flakes (not found) were then removed. The total number of missing flakes is unable to be determined however the two un-refitted flakes (12478 and 12479) are most probably from within that set. It is not apparent which reduction took place next, but 12477 would have had to have been removed with the core rotated from the angle used in the initial reduction sequence. In this secondary sequence 12473 was removed, then a now-missing flake, then 12474, then another now-missing flake. This left 12475 as the terminal ‘core’.

**Figure 8** Harris Matrix for ODX_10499 tektite refit. Produced by Harrison Pitts for HEH.
Discussion and Conclusions

An analysis of the literature has revealed very little mention of tektites in an *in situ* archaeological context. The tektites described by Cleverly (1991, 1995) were reviewed for their geological, rather than their archaeological or cultural, significance and many have no discernable or reliable provenance which limits their archaeological value. Cleverly (1991:220) stressed that many collectors desire only intact or near intact tektites and so disregard or discard tektite flakes and/or implements which are viewed as fragments with little or no geological, commercial or aesthetic value.

Similarly, the collection of 385 tektite flakes analysed by Akerman (1975:117-118) has limited archaeological contextual value. The previous owner and collector of the tektites had assured Akerman that the entire collection had come from one area; a site of approximately 200m² in close proximity to a *gnamma* hole but Akerman had not visited the site so could not verify this claim. Although the context of the finds is not well-established, there is some merit in the value of the analysis performed. Akerman described and contextualised the morphology of the flakes and formally identified and confirmed that the australites were in fact used in the manufacture of not just arbitrary flakes, but formal tool types. His discussions with local Aboriginal groups also gave ethnographic insights into the uses of these flakes and tools.

The most comprehensive, detailed and systematic account of tektites in archaeological sites is Johnson's (1963, 1964) two-part report in which he described 55 open sites from northern South Australia and adjoining areas, which are archived in the South Australian Museum. Of the 55 sites, 22 contained australites or australite fragments. Interestingly a number of these sites with tektites also contain ground ochre, or unmodified pigment, and this association was also noted at two sites in the Olympic Dam study area and may lend further credence to their significance and use in aboriginal rituals and ceremony. The majority of the finds appear to be intact tektites, tektite cores and tektite flakes; although several tektite backed artefacts (microliths) were also described.
While the identification of australite backed artefacts generally places their use as a raw material in the Holocene (see Hiscock 2008:145–161; Attenbrow et al. 2009:27–65) the discovery of a flake from ODX_09823-ODX_09833 at Olympic Dam, dated within the terminal Pleistocene, demonstrates the use of tektites as a raw material for thousands of years. The Pleistocene date for tektite use is not a solitary find but is supported by the discovery of two tektite flakes in a rock shelter in 1971 in the Ord River Valley region of Western Australia where Cleverly and Dortch (1975) found two tektite flakes in a distinct artefact layer below sediments that were dated to 18,000 BP (see also Flood 2004:98-99). Additionally, in his review of Australian desert archaeology Smith (2013:176) simply noted that during the last 10,000 years people collected tektites (‘glass meteorites’) from ‘strewn fields’ on the Nullarbor Plain.

While it is possible to date the use of tektites in some archaeological sites, it is impossible to gauge the antiquity of their ideological significance. Myths relating to the importance of tektites and more generally to meteorites exist in the oral traditions of Aboriginal people throughout Australia (see Bevan and Bindon 1996; Cowan 1985; Hamacher and Norris 2009, 2010; Hiscock 2013). These stories illustrate the importance and possible antiquity of their ideological significance. The literature also highlights that unmodified intact tektites were highly prized for their ritual significance, but identification of culturally significant tektites is problematic; how is it possible to separate the cultural from the natural?

What is known however, is that tektites are, and have been significant items culturally and commercially; historically they have been highly prized as curios and items of great collectability. Prior to European contact they were esteemed by Aboriginal people for their ideological significance and for their use in the production of stone flakes and tools. In modern times their value has been as collectables, souvenirs, trade goods and objects of geological interest. As a result of their widespread intrinsic desirability, they have been systematically plundered from both the general landscape and archaeological sites throughout southern Australia.
A comprehensive study of the assemblages from Olympic Dam and archived collections housed in museums across Australia (particularly those mentioned by Johnson 1963, 1964) could provide data on the general nature and attributes of tektite flakes as well as the approaches of different stone knappers to tektite reduction. Such a study could potentially augment existing knowledge of their use and provide additional data on the unique position this rare raw material has in Aboriginal material culture.

Acknowledgements
This study was developed from initial work performed as part of the research-based survey and salvage program conducted by Huonbrook Environment and Heritage (HEH) Pty. Ltd. for BHP Billiton at Olympic Dam, South Australia, to conform with the requirements of the Olympic Dam Agreement between BHP Billiton and the Barngala, Kokotha and Kuyani Aboriginal communities. I thank them for all their support and advice. I would also like to thank Harrison Pitts especially for his remarkable skill and patience in refitting the minute tektite flakes described here, and his permission to use the modified Harris Matrix he developed for his ongoing research.

References


Hughes, P., M. Sullivan, F. Williams, N. Spooner and D. Questiaux in prep. Sand dune formation over the last 140 ka in the Olympic Dam desert, arid northern South Australia.


Pitts, H. in prep. A Study of Large Quartzite Knapping Floors from a Site Complex at Olympic Dam, South Australia. BA Honours thesis, Australian National University.


Sullivan, M., P. Hiscock and P. Hughes 2014 Three scales: The three scales of GIS and GPS technology in archaeological salvage at Olympic Dam in arid South Australia. *Journal of the Anthropological Society of South Australia* 38.