# 10.2. Appendix for Chapter 4.0

Site ID	Fuel Type	Notes
13	Wood	
30	Charcoal	
54	Charcoal	
55	Charcoal	
61	Peat	
82	Wood	
126	Peat	Peat cutting found underneath mound when excavated during my fieldwork
198	Peat	Lumps of hearth ash found on-site were recreated by burning lumps of originally unburnt peat from this site in a muffle furnace.
229	Shale	
239	Peat	Peat cutting was clearly taking place here as fragments of cut peat were discovered in alluvial deposits (post-dating the site).
280	Peat	Peat cutting evidence
298	Peat	
298	Charcoal	
312	Peat	

Table 10.2.1 Evidence for fuel used to make salt within the research study area

Table 10.2	.2 All Stages	s of salt-produ	iction prese	nce/absence	e for all sites

Site ID	Stage 1	Stage 2	Stage 3	Stage 4
1	No	No	Yes	No
4	No	No	No	No
5	No	Yes	No	No
6	No	No	No	No
8	Yes	Yes	No	No
9	No	No	No	No
10	No	No	No	No
11	No	Yes	Yes	Yes
13	Yes	Yes	No	Yes
14	Yes	Yes	No	Yes
15	Yes	Yes	No	Yes
16	No	No	No	No
17	No	No	No	No
18	No	No	No	No
19	No	No	No	No
20	No	Yes	No	No
21	No	No	No	No
22	No	No	No	No

Site ID	Stage 1	Stage 2	Stage 3	Stage 4
23	No	No	No	No
24	No	No	No	No
25	No	No	No	No
26	No	No	No	No
27	No	No	No	Yes
28	No	No	No	No
29	No	No	No	No
30	Yes	Yes	Yes	Yes
32	No	Yes	No	Yes
33	No	No	No	No
34	No	No	No	Yes
35	No	No	No	Yes
36	No	No	No	No
37	No	No	No	No
38	Yes	No	No	No
39	No	No	No	No
40	No	No	No	No
41	No	No	No	No
42	Yes	No	No	No
43	No	No	No	Yes
44	No	No	No	Yes
45	No	No	No	Yes
46	No	No	No	No
47	No	No	No	No
48	No	No	No	No
49	No	No	No	No
50	No	No	No	No
51	No	No	No	No
52	No	No	No	No
53	No	No	No	Yes
54	No	No	No	Yes
55	No	No	No	No
56	No	No	No	No
57	No	Yes	No	No
58	No	No	No	Yes
59	Yes	Yes	No	Yes
60	No	No	No	Yes
61	Yes	Yes	No	No
62	Yes	Yes	No	No
63	No	No	No	Yes
64	No	Yes	No	Yes
65	No	No	No	No
66	No	No	No	No
67	No	No	No	Yes
68	No	No	No	No

Site ID	Stage 1	Stage 2	Stage 3	Stage 4
69	No	No	No	No
70	No	No	No	No
72	No	No	No	No
73	No	No	No	No
74	No	No	No	No
75	No	No	No	No
76	No	No	No	No
77	No	No	No	No
78	No	No	No	No
79	No	No	No	No
80	No	No	No	No
81	No	No	No	No
82	Yes	Yes	Yes	Yes
84	No	No	No	No
85	No	No	No	No
88	No	No	No	No
90	No	Yes	No	Yes
92	No	No	No	No
93	No	No	No	No
94	No	No	No	No
96	No	No	No	No
98	Yes	No	No	Yes
99	No	No	No	Yes
100	No	No	No	Yes
101	No	No	No	Yes
102	No	No	No	Yes
103	No	No	No	Yes
104	No	No	No	Yes
105	No	No	No	No
106	No	No	No	Yes
107	No	No	No	Yes
108	No	No	No	Yes
109	No	No	No	Yes
110	No	No	No	Yes
111	No	No	No	Yes
112	No	No	No	Yes
113	No	No	No	Yes
114	No	No	No	Yes
115	No	No	No	Yes
116	No	No	No	Yes
117	No	No	No	Yes
118	No	No	No	Yes
119	No	No	No	Yes
120	No	No	No	No
121	No	No	No	Yes

Site ID	Stage 1	Stage 2	Stage 3	Stage 4
122	No	No	No	Yes
123	No	No	No	Yes
124	No	No	No	Yes
125	No	No	No	Yes
126	No	No	No	Yes
127	No	No	No	Yes
128	No	No	No	Yes
129	No	No	No	Yes
130	No	No	No	Yes
131	No	No	No	Yes
132	No	No	No	Yes
133	No	No	No	Yes
134	No	No	No	Yes
135	No	No	No	Yes
136	No	No	No	Yes
137	No	No	No	Yes
138	No	No	No	Yes
139	No	No	No	Yes
140	No	No	No	Yes
141	No	No	No	Yes
142	No	No	No	Yes
143	No	No	No	Yes
144	No	No	No	Yes
145	No	No	No	Yes
146	No	No	No	Yes
147	No	No	No	Yes
148	No	No	No	Yes
149	No	No	No	Yes
150	No	No	No	Yes
151	No	No	No	Yes
152	No	No	No	Yes
153	No	No	No	Yes
154	No	No	No	Yes
155	No	No	No	Yes
156	No	No	No	Yes
157	Yes	Yes	Yes	Yes
158	No	No	No	Yes
159	No	No	No	No
160	No	No	No	Yes
161	No	No	No	Yes
163	No	No	No	Yes
164	No	No	No	Yes
165	No	No	No	Yes
166	No	No	No	Yes
167	No	No	No	Yes

Site ID	Stage 1	Stage 2	Stage 3	Stage 4
168	No	No	No	Yes
169	No	No	No	Yes
170	No	No	No	Yes
171	No	No	No	Yes
172	No	No	No	Yes
173	No	No	No	Yes
174	No	No	No	Yes
175	No	No	No	Yes
176	No	No	No	Yes
177	No	No	No	Yes
178	No	No	No	Yes
179	No	No	No	Yes
180	No	No	No	No
181	No	No	No	Yes
182	No	No	No	Yes
183	No	No	No	Yes
186	No	No	No	No
188	No	No	No	No
189	No	No	No	Yes
190	No	No	No	No
192	No	No	No	Yes
197	No	No	No	No
198	No	Yes	No	Yes
207	No	No	No	Yes
208	No	No	No	Yes
209	No	No	No	Yes
210	No	No	No	Yes
211	No	No	No	Yes
212	No	No	Yes	No
213	Yes	Yes	Yes	Yes
214	No	No	No	Yes
215	No	Yes	No	Yes
216	No	Yes	No	Yes
217	No	Yes	No	No
218	No	Yes	Yes	Yes
220	No	Yes	Yes	No
221	No	No	No	Yes
222	No	No	No	Yes
223	No	Yes	No	Yes
224	No	No	No	No
225	No	Yes	No	Yes
226	No	Yes	No	Yes
227	No	No	No	Yes
228	No	Yes	No	No
229	No	Yes	No	Yes

Site ID	Stage 1	Stage 2	Stage 3	Stage 4
230	No	Yes	No	Yes
231	Yes	No	No	No
232	No	No	No	Yes
233	Yes	No	No	Yes
234	No	No	Yes	No
236	No	No	No	No
237	No	No	Yes	Yes
238	No	No	Yes	Yes
239	Yes	Yes	No	No
240	Yes	No	No	No
241	No	No	No	No
242	Yes	No	No	No
243	No	No	Yes	No
244	No	No	No	No
245	No	Yes	No	No
246	No	No	No	No
247	No	No	No	No
248	No	No	No	No
249	No	No	No	Yes
250	No	No	No	No
251	No	No	No	No
252	No	No	No	No
255	No	No	No	No
260	No	No	Yes	Yes
261	No	No	No	Yes
262	No	No	No	Yes
263	No	No	Yes	Yes
264	No	No	No	Yes
265	No	No	No	Yes
266	No	No	No	Yes
268	No	No	No	No
269	No	No	No	No
270	No	No	No	No
271	No	No	No	No
272	No	No	No	No
273	No	No	No	No
274	No	No	No	No
275	No	No	No	No
276	No	No	No	No
277	No	No	No	No
278	No	No	No	No
279	No	No	No	No
280	No	No	No	Yes
281	No	No	No	No
282	No	No	No	No

Site ID	Stage 1	Stage 2	Stage 3	Stage 4
283	No	No	No	Yes
284	No	No	No	Yes
285	No	No	No	No
286	No	No	No	No
287	No	No	No	No
288	No	No	No	No
289	No	No	No	No
290	Yes	No	No	No
292	Yes	No	No	Yes
293	No	No	No	No
294	No	Yes	No	Yes
295	No	No	No	Yes
296	No	No	Yes	No
297	No	No	No	No
298	No	No	No	No
299	No	Yes	Yes	No
301	Yes	Yes	Yes	Yes
302	No	No	No	Yes
303	No	No	No	Yes
304	No	No	No	No
305	No	No	No	Yes
306	No	No	No	Yes
307	No	No	No	No
308	Yes	Yes	No	No
309	Yes	No	No	No
310	No	No	No	No
311	No	Yes	No	No
312	Yes	Yes	No	No
313	No	No	No	No
314	Yes	No	No	No
315	No	No	No	No
316	No	Yes	No	Yes
317	No	No	No	Yes

 Table 10.2.3 Summary table of all Stages Presence/Absence for all sites

	Stage 1	Stage 2	Stage 3	Stage 4
Present	26	38	18	147
Not Present	250	238	258	129
Total	276	276	276	276

Table 10.2.4 Total Detailed Feature Types associated with Stage 1 of the salt-production process

Detailed Features Associated with Water Management	Total
Feeder	17
Feeder Connected Tank	1
Natural Channel Inlet	33
Natural Channel Inlet connected tank	1
Reservoir	4
Settling/Evaporation Tank	169
U-shaped feeder	11
V-shaped feeder	1
Water Storage Pit	4
Unknown	1
Total	242

Table 10.2.5 Total Detailed Feature Types associated with Stages 2 and 3 of the saltproduction process

Detailed Features Associated with Stages 2 and 3	Total
Burnt Clay Pit	3
Burnt Surface	8
Chambered Oven	2
Clay Floor	8
Clay Lined Hearth	70
Clay Platform	5
Ditch/Gully Hearth	5
Flue (heat supply)	1
Hearth Unknown	22
Single Stokehole Oven	9
Stokehole clay lined hearth	3
Stone lined hearth	1
Surface Burnt Clay	4
Surface Clay Walled Hearth	3
Total	144

	County							
Feature Form	Cornwall	Somerset	Dorset	Hampshire	MOI	West Sussex	Kent	
Circular/Sub- circular/Oval	0	0	5	0	0	0	44	
Rectangular/Sub- rectangular	2	5	6	0	0	0	5	
Irregular	0	1	0	1	0	0	5	
Linear	0	0	1	0	0	1	3	
Unknown	0	1	0	0	0	0	0	
Total	2	7	12	1	0	1	57	

#### Enclosed Hearth (Direct Heat)

### Table 10.2.7 Form and location for Enclosed Hearth (Indirect Heat) features

				,				
	County							
Feature Form	Cornwall	Somerset	Dorset	Hampshire	NOI	West Sussex	Kent	
Circular/Sub-circular/Oval	0	0	0	0	0	0	1	
Rectangular/Sub-rectangular	0	0	0	0	0	0	2	
Irregular	0	1	0	1	0	0	0	
Linear	0	0	0	0	0	0	0	
Unknown	0	0	0	0	0	0	1	
Total	0	1	0	1	0	0	4	

### **Enclosed Hearth (Indirect Heat)**

#### Table 10.2.8 Form and location for Oven (Indirect Heat) features

#### **Oven (Indirect Heat)**

	County							
Feature Form	Cornwall	Somerset	Dorset	Hampshire	NOI	West Sussex	Kent	
Circular/Sub-circular/Oval	1	0	4	0	1	0	0	
Irregular	0	0	0	0	0	0	0	
Linear	0	0	1	0	0	0	0	
Rectangular/Sub-rectangular	2	0	0	0	0	0	0	
Unknown	0	0	3	0	0	0	0	
Total	3	0	8	0	1	0	0	

Table 10.2.9 Form and location for Open Hearth (Direct Heat) features

	•	•		•				
	County							
Feature Form	Cornwall	Somerset	Dorset	Hampshire	NOI	West Sussex	Kent	
Circular/Sub-circular/Oval	0	1	2	0	0	0	2	
Irregular	0	1	0	0	1	0	0	
Linear	0	0	0	0	0	0	0	
Rectangular/Sub-rectangular	0	0	0	3	0	0	0	
Unknown	0	0	0	0	0	0	8	
Total	0	2	2	3	1	0	10	

#### **Open Hearth (Direct Heat)**

 Table 10.2.10 Total Detailed Feature Types associated with Stage 4 of the salt-production process

Detailed Feature Type for Stage 4	Total Features
Burnt Surface	1
Clay Floor	1
Debris/Deposition Layer	44
Debris Mound	136
Debris Pit	28
Total	210

Experimental Salt-Production using some Traditional Hearth and Briquetage Forms observed in Iron Age and Romano-British Salt-Production sites in the Fenlands. 2006

**Observations and Photographs** 

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## Overview

As part of a 'Salt Day' in Lincolnshire, where various speakers came together to share archaeological research on salt-production in the UK (including the author), an informal day of traditional salt-production was planned. Although some of this included use of traditional hearths and briquetage types used in Iron Age and Romano-British salt-production in the Fenlands, modern techniques and tools were used also, due to time restraints. Therefore, although this was not conducted as a 'scientific' experiment or 'true experiment', only using ancient techniques and tools, it was still a very useful day for observing the amount of work and skill that would have been required to create and use these sites. The day provided a great opportunity to gain a small insight into the various elements that would have required consideration, planning and organisation in order for a salt-production site to be successful. It also provided the opportunity for people studying salt-production, to come together and informally discuss these sites, including sharing and debating of ideas, whilst in the landscape setting of traditional salt-production in the Fens.

This report provides a summary of observations made during this day, using photographs. The photographs are provided according to general stages of activity. They are numbered sequentially and the index is provided below. A summary of key observations are provided at the end.

#### Photographic Index for Salt Day Experiments

1	View of working area and the natural estuary water inlet supplying saltwater to the site
2	View of the Natural Saltwater Inlet
3	One of the natural sources of clay used to create briquetage and clay- line the features
4	Providing the tools and Briquetage for the site
5	Pre-made briquetage (small brine transfer cups). Blue containers contain extra saltwater
6	Pre-made briquetage including Rounded Pedestals
7	Pre-made containers (Fenland Type) and some pedestals created on- site being left to bake dry in the sun
8	Chopping wood to provide fuel for the hearths
9	Chopping wood to provide fuel for the hearths

10	Pre-fabricated pressed slabs of <b>peat</b> for use as fuel alongside wood
11	<b>Brine Tanks</b> excavated and being clay-lined (second stage of lining after first had been left to dry for a couple of hours). Based upon Fenland rectangular tanks
12	Finished clay-lined brine tanks
13	Getting saltwater from the nearby estuary inlet using modern plastic buckets
14	Pouring saltwater into the brine tanks
15	Pouring saltwater into the brine tanks
16	Saltwater left to settle/partially concentrate in the sun. Note the air bubbles-despite two clay linings the water still seeped into the clay slowly
17	Fuel placed inside the main <b>Enclosed Hearth (Indirect Heat)</b> which used a stokehole to provide the heat
18	Fire is set within the hearth's stokehole and is left to establish and bake the clay lining
19	Briquetage <b>Containers</b> (Trapezoid Fenland Type) placed on top of the hearth and raw clay briquetage <b>Stabilisers</b> (pinch-props) and spacers added to the containers
20	Brine added to the containers
21	Brine artificially evaporated in the containers and salt starts to crystallise on the brine surface and on the edges of the containers
22	Brine is transferred between containers to stop the containers drying out.
23	The container closest to the fire is hotter and therefore crystallises salt quicker
24	Close up of pinch-prop and crystallised salt forming on the brine surface
25	Wet salt 'sludge' which has been gradually taken off the brine surface with a ladel
26	<b>Open Hearth</b> created on the ground surface with accompanying trough type briquetage containers and brick pedestals with central holes to allow for even heat transfer and more stable structure
27	Briquetage in-situ over the open hearth
28	The main Enclosed Hearth dismantled and briquetage removed for observation. Note the large amounts of crystal salt covering most of the hearth lining
29	Close up of hearth lining covered in crystallised salt
30	Close up of hearth lining covered in crystallised salt
31	Removed briquetage showing clear signs of use-wear on their surfaces. Note the circular pedestal impressions left on the base of the containers. This is sometimes noted on archaeological examples in the Fenlands (Tom Lane <i>pers comm</i> .)





























# **Key Observations**

- Needs a crust of salt crystals to form on the top of the water, then the key is to break it up so that the water can still evaporate
- Make sure the containers are regularly topped up with more brinepreferably by topping up the front container to the one behind, and then the second containers from the one behind that and so on
- Stabilisers only really needed if there is no above ground structure
- Better to have hearth open to the elements because wind is a key factor in the evaporation process
- Process once started only needs one person per hearth, but to get the raw material and build the feature needs a good three or four people?
- The crystalline structure of the salt can be altered drastically by the temperature of the hearth
- At the end of the day the enclosed hearth was dismantled and some of the clay lining was still soft. The base was full of charcoal lumps and fragments of burnt clay lining, some of it still retained block like characteristics. A lot of general fragmented clay with a salt crust on the outside. It was difficult to separate the lining and fragments of broken briquetage visually
- Briquetage props generally exploded a lot. Briquetage supports used in the open hearth all exploded due to being subjected to direct heat therefore the supports need to be made well and tempered well to survive-this required technological knowhow
- The brine tanks were constructed the day before on a very dry and hot day and then the first lining of clay was applied and the tanks were left to bake in the sun. The morning of the experiment the lining was repaired after large cracks appeared in it. Then water from a nearby creek was added to the tanks. The water levels declined during the day- a mixture of seepage and evaporation. Therefore maybe it was better to fire the linings?
- The creek was extremely dry as were others nearby due to the heat, would this have been a problem originally?