

Report on 2013 Excavations at Wonderwerk Cave, Kuruman District (9/2/055/0005)
 approximately at 27° 50' 47.76" S, 23° 33' 13.32" E

Permit 80/12/05/017/51

Permit Holder: Michael Chazan (University of Toronto)

The 2013 excavation was a brief season focused on developing the field methodology that would serve renewed excavations at Wonderwerk Cave.

Season Dates: 2-18 December

Name	Role	Dates
Michael Chazan	Project director	2-18 December?
Francesco Berna	Project co-director	2-18 December?
Michaela Ecker	PhD student, Spatial data manager	2-18 December?
Megan Thibodeau	Masters student SFU	2-18 December?
Jen Anderson	Undergraduate student SFU	2-18 December?
Neels Namusa	Employee	2-18 December?
Visitors:		
Stephen Wessels	ZAMANI project, Surveyor	2-4 December
Liora Horwitz	Project co-director	12-16 December
Louis Scott	Pollen expert, University of the Free State	14 December
Marion Bamford	Botanical expert, University of the Witwatersrand	9 December
Michael Toffolo	Geoarchaeologist	12-16 December?

Establishing Grid System for Renewed excavation

Excavations at Wonderwerk Cave, beginning with Malan and continuing with Beaumont used a grid systems based on yards square. For the new excavations a new grid was needed based on a number of considerations. The first was the difficulty of working in Yards as a basic unit of measurement using modern survey equipment. Note that Beaumont used a metric system for measuring depth. A second problem was the difficulty of reestablishing the Beaumont grid with the necessary degree of precision.

The new grid is based on quarter meter square (50 cm. on each side) units. Figure 1 shows the new grid (indicated by white boxes running north-south and east-west along with the Beaumont grid indicated in orange. The new excavation is organized as a series of operations focusing on different time periods, indicated on the plan with white boxes numbered one through 4. For 2013 excavation focused on Operation 1 to the north of Beaumont's deep sounding.



Description of control points set 2013:

S1 is outside the modern gate to the cave. Right-hand before the entrance door are large boulders. On top of the right-hand large, flat boulder is a red spray paint point. The Datum is in the middle spot, which is a small hollow.

S2 is on the right-hand site of the cave, outside the walkway. Opposite of the large stalagmite, over the walkway, is a large flat dolomite block on the ground. A red dot (outer and inner circle) is spray-painted on it with a black dot within. Do not confuse with the white dot that is also on the same block about half a meter further into the cave.

S4 is on the right-hand side of the cave outside the walkway. It is on the top of a metal pole, the 11th on the outside of Exc2, starting to count from the cave entrance. The metal pole has a flat (although not straight) top with red paint on it. It is close to the walkway and can be measured from there with a prism. The measured point is on the flattest area on the top. S4 is written on the side of the metal pole and on the metal pole on the walkway closest to it for orientation.

S6 after the cave and walkway take a bend, there is a large flat rock standing out in the middle of the area to the right of the walkway; before Exc6 is reached. It is broken into two. The reference point is on the larger piece, close to the break. It is a red circle with a red dot and black label. Do not confuse with white dots from bird droppings that look like points. Needs a light and brush to find.

Description of datum reference points set 2013:

R1 is Peters white dot on the left cave wall above Exc 1. The black spot in the centre is the point to measure.

R2 is on the large stalagmite in front of Exc 1. Its right-hand site has two red points with white centres. The upper white-red-circle, labelled 1-2, has a black dot in the white inner circle, which is the point to measure. It normally needs a flash light illuminating it to be able to see from the total station.

R3 after passing Exc1 and Exc2, the walkway reaches a platform. Behind the platform, outside the walkway, a rock on the ground is painted with a white quadrant. It is marked in black as the P/Q line (Beaumont excavation). On the top of the black line is a black cross. The middle of the cross

is the point to measure. R3 is written on the white surface next to it. Through the new walkway it is not possible to measure this point with the laser any more, and the total station needs to be high to reach over the walkway platform.

R4 just before the cave makes its last bend, there are three white circles on the left cave wall. The uppermost of the 3 (opposite S5) in the middle is the point.

R6 is right-hand from S6, a few meters further into the cave. On the right-hand cave wall is a boulder with a smooth surface turned towards the walkway. There is a red dot on it. It is next to Beaumont's square BB134.

R7 is at the back cave wall. Where the walkway platform ends, there are three excavated steps at the back called Exc6. Strings from the former grid system are attached to the back wall. The 6th string is loose and stuck with glue to the wall. It is between Beaumont's squares T152 and U152. It is marked with a red spot and labelled REF.

Excavation methods and equipment

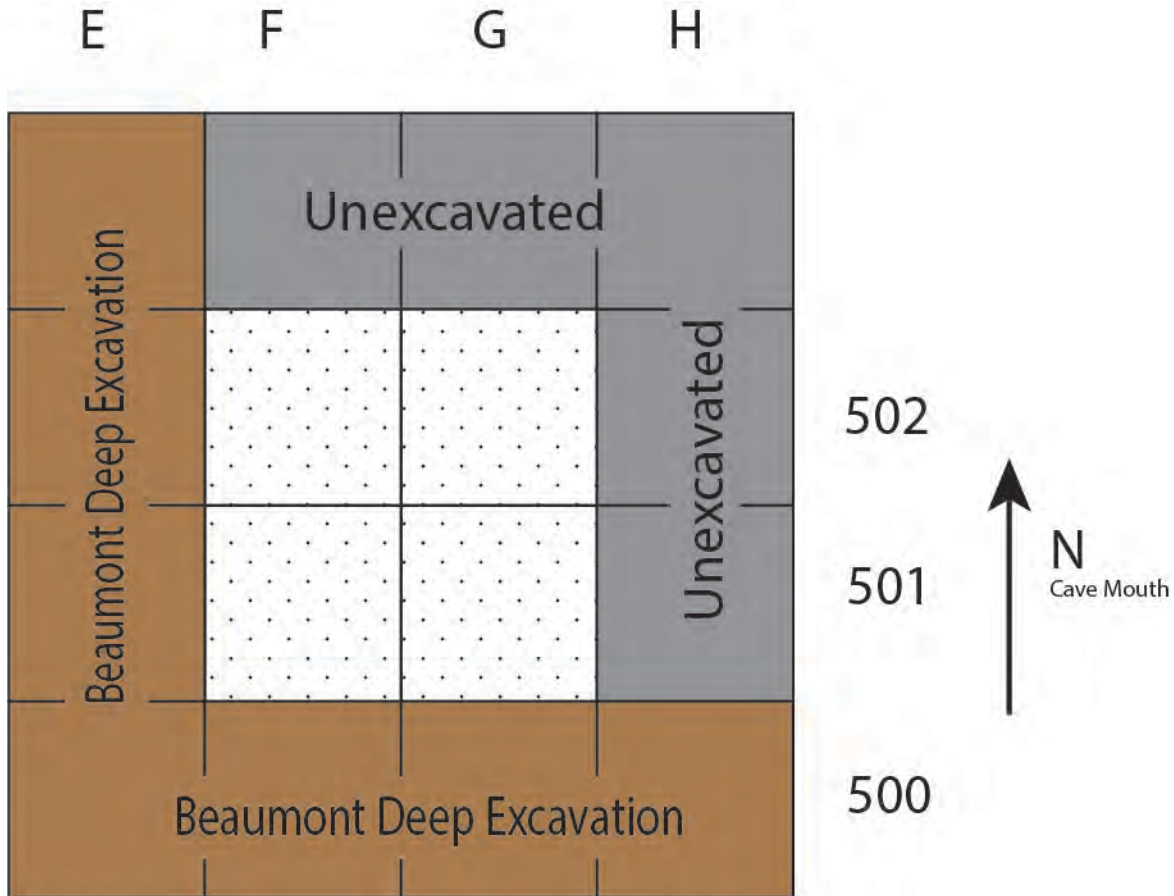
A key goal of this season was to develop the excavation methods to use as the scale of excavation increased. All finds and samples were plotted using a total station. Excavation was by decapage with finds left in situ until a surface was fully exposed. Sediments were processed using wet sieving with nested geological sieves. Several problems were encountered which inform revisions to field method for future seasons. Wet sieving led to sediments swelling and becoming almost impossible to move through the sieves. The long-term solution is to move to flotation with a machine that agitates the sediment before sieving. We also found decapage excavation difficult in highly cemented sediments. Excavation in these contexts is forced to proceed by scraping or by peeling off thin layers of sediment.

Results

Excavation was limited to squares F502, G501, G502, F501, F500 in operation 2

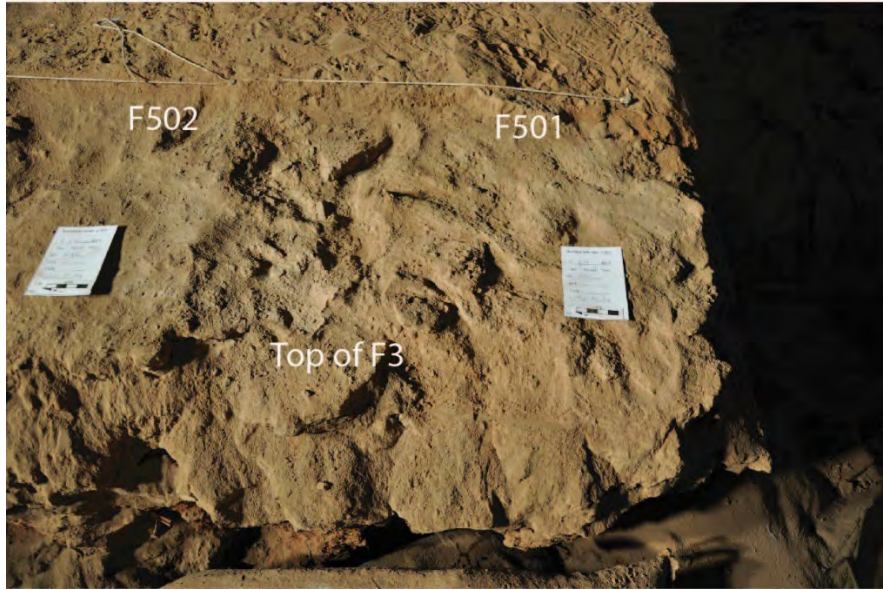
<i>Operation 2 (Exc1)</i>	
1	F502, G501, G502
2	F501, G502, G501,
3 and 4	F501, G502, G501, F500

5	F501, F500
6	F501
7	F500, F501

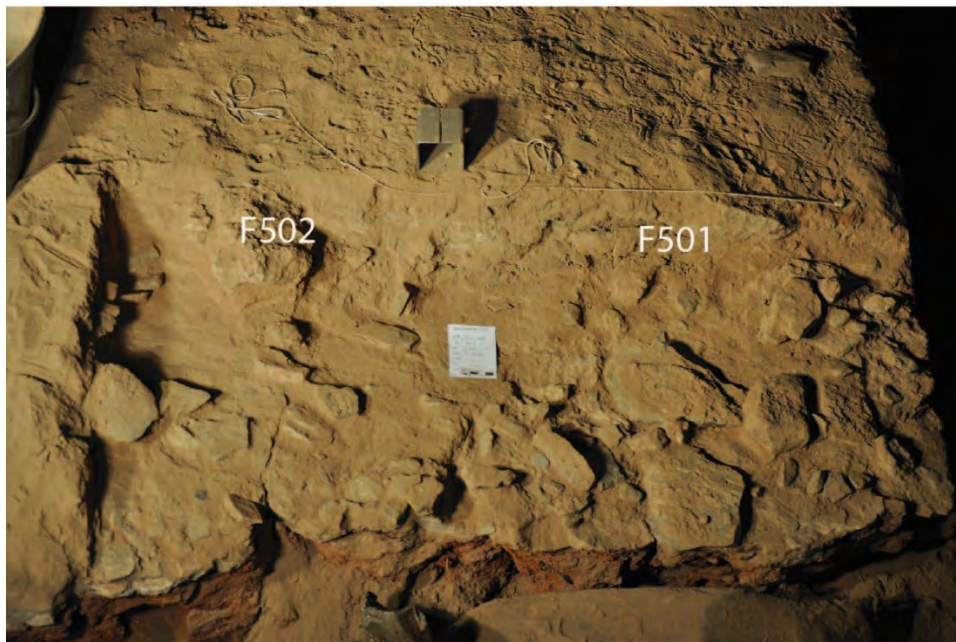
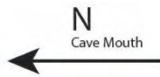


Area of 2013 Excavation. Note that excavation extended slightly into Row 500.

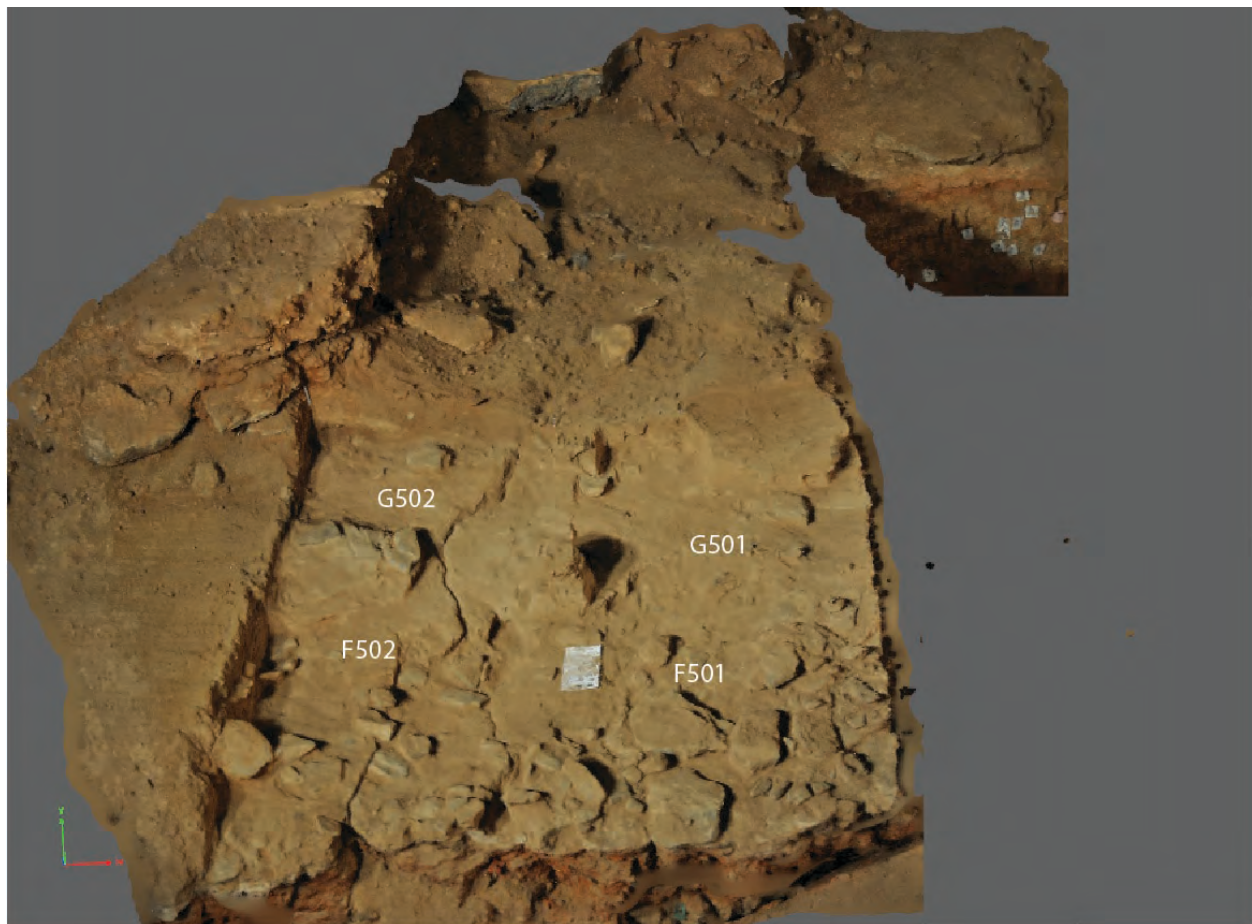
Excavation was in loose disturbed sediments (Feature 1-2) cemented grey sediments (Feature 3-4) and limited excavate on of underlying sediments in F500 and F501 (Feature 5-7). Artifacts and flat stones were found lying flat on within the Unit 1-4 sediments. There is cracking of the sediments along a long fissure. It is not clear if this has formed since the Beaumont excavation or if this is an older feature.



Top of Feature 3 (cemented grey sediment) in Squares F502 and F501



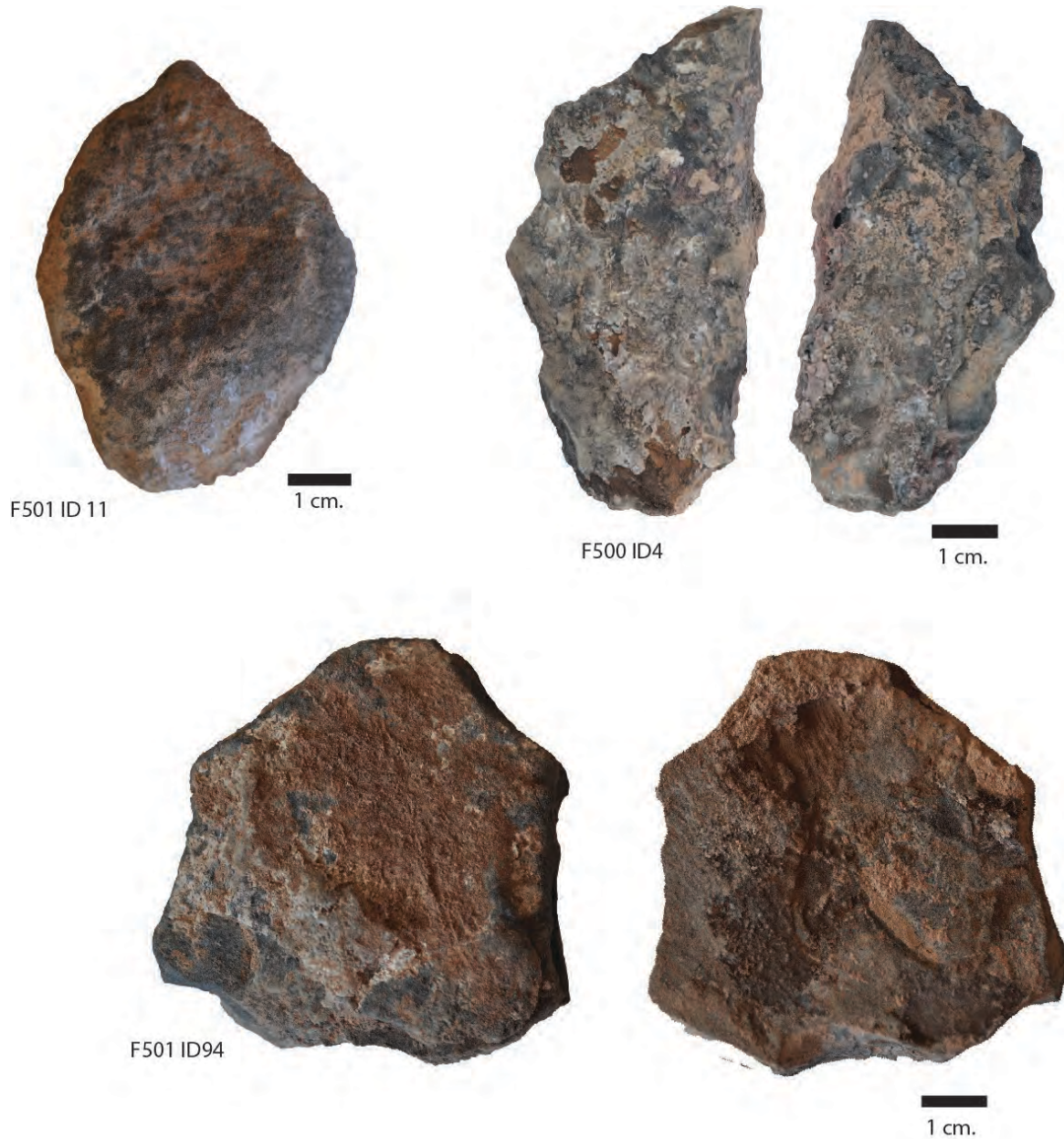
Artifacts and flat lying stones in Feature 3



Photogrammetric model of excavation area showing flat lying artifacts and rocks in Feature 3 (cemented grey sediments).

Artifacts

Artifacts are almost all on dolostone or heavily altered ironstone. Much of the lithic material is poorly preserved with differential weathering on the two surfaces. In some cases the bottom surface is heavily weathered with a red iron rich surface. The cause of this surface alteration is a subject for further investigation but is distinctive to this context. Two of the artifacts can be classified as crude bifaces. A number of lithic objects with clear signs of burning were also recovered.



Artifacts from the 2013 excavation



G501 ID 21



—
1 cm.



G502 ID 10



—
1 cm.

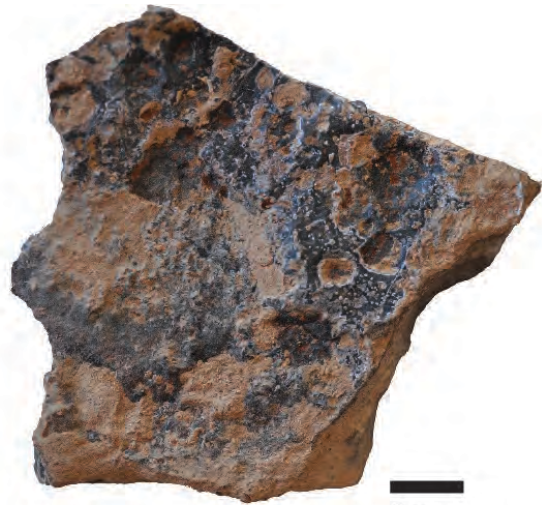
Bifaces from the 2013 excavation. Note the alteration on the right image of G502 ID 10



G501 ID 9



1 cm.



F502 ID 79



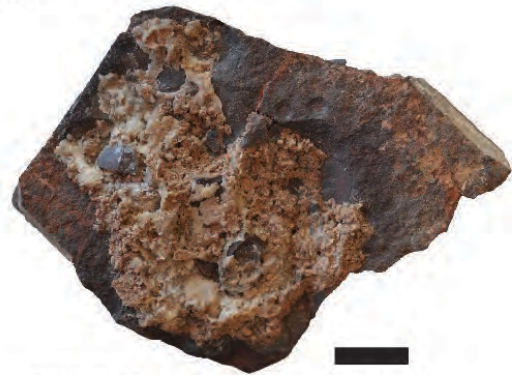
1 cm.



G502 ID 13



1 cm.



F502 ID 33



1 cm.

Lithic objects showing evidence of burning.

Spatial Coordinates for lithic samples

RecNo	UNIT	ID	SUFFIX	X	Y	Z	FIND	F	COMMENT	PRIS
123	G500	2	0	499.797	499.956	98.035	irons tone	3		0
473	E502	1	0	498.988	500.977	97.943	lithic	4		0
93	F500	1	0	499.247	499.97	97.952	lithic	3		0
94	F500	1	1	499.269	499.975	97.963	lithic	3		0
95	F500	1	2	499.217	499.956	97.945	lithic	3		0
96	F500	1	3	499.243	499.969	97.968	lithic	3		0
235	F500	4	0	499.361	499.982	97.933	lithic	3		0
236	F500	4	1	499.305	499.932	97.936	lithic	3		0
237	F500	4	2	499.333	499.956	97.958	lithic	3		0
580	F500	8	0	499.244	499.928	97.797	lithic	7		0
581	F500	8	1	499.231	499.89	97.788	lithic	7		0
582	F500	8	2	499.235	499.897	97.809	lithic	7		0
602	F500	9	0	499.419	499.849	97.556	lithic	3/ 4	from collapsed block in northern section in red sediment underlying lower gray horizon	0
206	F501	34	0	499.145	500.44	97.925	lithic	3		0
249	F501	48	0	499.324	500.079	97.911	lithic	4	location approx	0
441	F501	63	0	499.283	500.07	97.867	lithic	6		0
442	F501	63	1	499.325	500.038	97.872	lithic	6		0
445	F501	66	0	499.196	500.409	97.909	lithic	4		0
446	F501	67	0	499.41	500.398	97.937	lithic	4		0
447	F501	67	1	499.446	500.411	97.946	lithic	4		0
459	F501	69	0	499.211	500.484	97.908	lithic	4		0
576	F501	78	0	499.267	500.242	97.826	lithic	7		0
577	F501	78	1	499.262	500.215	97.825	lithic	7		0
578	F501	78	2	499.269	500.21	97.851	lithic	7		0
587	F501	81	0	499.323	500.083	97.838	lithic	7		0
588	F501	81	1	499.343	500.084	97.84	lithic	7		0
589	F501	81	2	499.313	500.054	97.831	lithic	7		0
590	F501	81	3	499.317	500.076	97.841	lithic	7		0
593	F501	84	0	499.335	500.036	97.822	lithic	7	location approximate	0
594	F501	85	0	499.357	500.012	97.824	lithic	7		0
596	F501	87	0	499.352	500.217	97.812	lithic	7		0
597	F501	87	1	499.382	500.211	97.819	lithic	7		0
598	F501	88	0	499.338	500.276	97.815	lithic	7		0

692	F501	91	0	499.249	500.455	97.895	lithic	5/7		0
693	F501	91	1	499.294	500.49	97.887	lithic	5/7		0
695	F501	91	2	499.318	500.446	97.903	lithic	5/7		0
696	F501	91	3	499.261	500.419	97.899	lithic	5/7		0
697	F501	91	4	499.293	500.444	97.931	lithic	5/7		0
701	F501	92	0	499.371	500.494	97.925	lithic	3	bottom f3, vertical orientation	0
702	F501	93	0	499.465	500.476	97.926	lithic	3-4		0
713	F501	94	0	499.499	500.016	97.962	lithic	3	bottom f3	0
714	F501	94	1	499.535	499.998	97.968	lithic	3	bottom f3	0
715	F501	94	2	499.537	499.947	97.971	lithic	3	bottom f3	0
716	F501	94	3	499.485	499.963	97.963	lithic	3	bottom f3	0
717	F501	94	4	499.523	499.972	97.983	lithic	3	bottom f3	0
77	F502	17	0	499.243	500.823	97.998	lithic	3		0
462	F502	29	0	499.23	500.508	97.921	lithic	4		0
464	F502	31	0	499.241	500.594	97.935	lithic	4		0
465	F502	31	1	499.218	500.577	97.933	lithic	4		0
467	F502	33	0	499.233	500.685	97.947	lithic	3	bottom f3	0
468	F502	33	1	499.259	500.737	97.951	lithic	3	bottom f3	0
469	F502	34	0	499.076	500.64	97.922	lithic	3	bottom f3	0
470	F502	35	0	499.107	500.627	97.93	lithic	3	bottom f3	0
471	F502	35	1	499.121	500.606	97.934	lithic	3	bottom f3	0
472	F502	36	0	499.139	500.633	97.935	lithic	3	bottom f3	0
475	F502	38	0	499.029	500.887	97.94	lithic	4		0
476	F502	39	0	499.086	500.828	97.954	lithic	4		0
477	F502	39	1	499.064	500.834	97.968	lithic	4		0
478	F502	40	0	499.208	500.994	98.029	lithic	3		0
479	F502	40	1	499.176	500.945	97.989	lithic	3		0
480	F502	40	2	499.176	500.945	98.029	lithic	3		0
481	F502	41	0	499.194	500.91	97.975	lithic	3	bottom f3	0
482	F502	42	0	499.319	500.805	97.96	lithic	3	bottom f3	0
483	F502	43	0	499.369	500.783	97.961	lithic	3	bottom f3	0
485	F502	43	1	499.36	500.76	97.945	lithic	3	bottom f3	0
486	F502	43	2	499.356	500.766	97.988	lithic	3	bottom f3	0
487	F502	44	0	499.431	500.802	97.992	lithic	3	bottom f3	0
489	F502	44	1	499.464	500.827	97.991	lithic	3	bottom f3	0
490	F502	44	2	499.44	500.821	98.003	lithic	3	bottom f3	0
491	F502	45	0	499.384	500.592	97.934	lithic	3	bottom f3	0
492	F502	45	1	499.403	500.674	97.946	lithic	3	bottom f3	0

493	F502	45	2	499.364	500.641	97.943	lithic	3	bottom f3	0
494	F502	45	3	499.379	500.632	97.951	lithic	3	bottom f3	0
495	F502	46	0	499.441	500.646	97.957	lithic	3	bottom f3	0
496	F502	46	1	499.426	500.606	97.935	lithic	3	bottom f3	0
497	F502	46	2	499.465	500.598	97.94	lithic	3	bottom f3	0
498	F502	46	3	499.446	500.604	97.955	lithic	3	bottom f3	0
499	F502	47	0	499.268	500.651	97.935	lithic	3	bottom f3	0
502	F502	49	0	499.215	500.765	97.948	lithic	3	bottom f3	0
503	F502	49	1	499.194	500.712	97.937	lithic	3	bottom f3	0
504	F502	49	2	499.246	500.723	97.94	lithic	3	bottom f3	0
505	F502	49	3	499.214	500.726	97.957	lithic	3	bottom f3	0
605	F502	57	0	499.105	500.7	97.922	lithic	3	bottom f3	0
606	F502	57	1	499.114	500.613	97.919	lithic	3	bottom f3	0
607	F502	57	2	499.079	500.618	97.907	lithic	3	bottom f3	0
608	F502	57	3	499.098	500.643	97.933	lithic	3	bottom f3	0
609	F502	58	0	499.083	500.709	97.933	lithic	3	bottom of feature	0
610	F502	59	0	499.253	500.765	97.934	lithic	3	bottom of feature	0
611	F502	59	1	499.278	500.765	97.933	lithic	3	bottom of feature	0
612	F502	59	2	499.275	500.761	97.939	lithic	3	bottom of feature	0
613	F502	60	0	499.313	500.765	97.935	lithic	3	bottom of feature	0
614	F502	60	1	499.294	500.75	97.933	lithic	3	bottom of feature	0
616	F502	60	2	499.306	500.761	97.934	lithic	3	bottom of feature	0
617	F502	61	0	499.294	500.798	97.947	lithic	3	bottom of feature	0
618	F502	61	1	499.301	500.783	97.941	lithic	3	bottom of feature	0
619	F502	62	0	499.352	500.763	97.924	lithic	3	bottom of feature	0
620	F502	62	1	499.333	500.737	97.926	lithic	3	bottom of feature	0
621	F502	62	2	499.342	500.755	97.931	lithic	3	bottom of feature	0
622	F502	63	0	499.342	500.813	97.959	lithic	3	bottom of feature	0
623	F502	63	1	499.34	500.779	97.943	lithic	3	bottom of feature	0
624	F502	63	2	499.343	500.796	97.957	lithic	3	bottom of feature	0
625	F502	64	0	499.361	500.835	97.967	lithic	3		0
626	F502	65	0	499.421	500.82	97.969	lithic	3	bottom of feature	0
627	F502	65	1	499.399	500.81	97.963	lithic	3	bottom of feature	0
628	F502	65	2	499.409	500.819	97.978	lithic	3	bottom of feature	0
629	F502	66	0	499.45	500.811	97.978	lithic	3	bottom of feature	0
630	F502	67	0	499.304	500.74	97.933	lithic	3	bottom of feature	0
631	F502	68	0	499.128	500.736	97.938	lithic	3	bottom of feature	0
632	F502	69	0	499.318	500.686	97.924	lithic	3	bottom of feature	0
633	F502	70	0	499.291	500.723	97.925	lithic	3	bottom of feature	0
634	F502	71	0	499.382	500.587	97.927	lithic	3	bottom of feature	0
635	F502	72	0	499.311	500.854	97.953	lithic	4	bottom of feature	0
636	F502	73	0	499.283	500.677	97.917	lithic	4		0
637	F502	73	1	499.262	500.638	97.915	lithic	4		0
638	F502	73	2	499.309	500.658	97.92	lithic	4		0
639	F502	73	3	499.286	500.651	97.925	lithic	4		0
640	F502	74	0	499.478	500.668	97.946	lithic	3	bottom of feature	0

641	F502	74	1	498.976	501.048	97.783	lithic	3	bottom of feature	0
642	F502	74	2	499.471	500.672	97.945	lithic	3	bottom of feature	0
643	F502	74	3	499.442	500.673	97.95	lithic	3	bottom of feature	0
644	F502	75	0	499.41	500.663	97.928	lithic	3	bottom of feature	0
645	F502	76	0	499.425	500.64	97.933	lithic	3	bottom of feature	0
646	F502	77	0	499.163	500.714	97.919	lithic	4/ 7		0
647	F502	77	1	499.223	500.687	97.906	lithic	4/ 7		0
648	F502	77	2	499.209	500.622	97.921	lithic	4/ 7		0
649	F502	77	3	499.162	500.619	97.921	lithic	4/ 7		0
650	F502	77	4	499.189	500.656	97.943	lithic	4/ 7		0
651	F502	78	0	499.355	500.807	97.953	lithic	3	bottom of feature	0
652	F502	79	0	499.141	500.866	97.951	lithic	3	burnt-bottom of feature	0
653	F502	79	1	499.19	500.87	97.958	lithic	3	burnt-bottom of feature	0
654	F502	79	2	499.206	500.838	97.962	lithic	3	burnt-bottom of feature	0
655	F502	79	3	499.184	500.824	97.955	lithic	3	burnt-bottom of feature	0
656	F502	79	4	499.18	500.832	97.973	lithic	3	burnt-bottom of feature	0
657	F502	80	0	499.088	500.877	97.95	lithic	3	burnt-bottom of 3	0
658	F502	81	0	499.02	500.862	97.932	lithic	3	pretty pebble-bottom of feature	0
659	F502	82	0	499.106	500.768	97.935	lithic	3	bottom of feature	0
660	F502	83	0	499.447	500.846	97.975	lithic	3	bottom of feature	0
661	F502	83	1	499.46	500.865	97.98	lithic	3	bottom of feature	0
662	F502	83	2	499.453	500.863	98.002	lithic	3	bottom of feature	0
663	F502	84	0	499.417	500.852	97.973	lithic	3	bottom of feature	0
664	F502	84	1	499.394	500.84	97.963	lithic	3	bottom of feature	0
665	F502	84	2	499.404	500.838	97.975	lithic	3	bottom of feature	0
666	F502	85	0	499.422	500.841	97.966	lithic	3	bottom of feature	0
667	F502	85	1	499.419	500.816	97.962	lithic	3	bottom of feature	0
668	F502	85	2	499.416	500.815	97.97	lithic	3	bottom of feature	0
669	F502	86	0	499.451	500.592	97.922	lithic	3	bottom f3	0
698	F502	87	0	499.375	500.51	97.927	lithic	3	bottom f3	0
699	F502	87	1	499.409	500.527	97.926	lithic	3	bottom f3	0
700	F502	87	2	499.394	500.522	97.934	lithic	3	bottom f3	0
752	F502	88	0	499.359	500.84	97.953	lithic	3	bottom f3	0
753	F502	88	1	499.387	500.824	97.955	lithic	3	bottom f3	0

754	F502	88	2	499.371	500.802	97.946	lithic	3	bottom f3	0
755	F502	88	3	499.369	500.824	97.956	lithic	3	bottom f3	0
756	F502	89	0	499.466	500.847	97.982	lithic	3	bottom f3	0
757	F502	90	0	499.459	500.801	97.974	lithic	3	vertical orientation	0
706	G500	26	0	499.616	499.985	97.99	lithic	3		0
707	G500	26	1	499.627	499.951	97.997	lithic	3		0
708	G500	26	2	499.624	499.968	98	lithic	3		0
109	G501	2	0	499.992	500.093	98.095	lithic	1	likely not in situ	0
703	G501	13	0	499.54	500.004	97.977	lithic	3		0
704	G501	13	1	499.556	499.99	97.98	lithic	3		0
705	G501	13	2	499.539	499.991	97.995	lithic	3		0
709	G501	14	0	499.684	500.068	98.003	lithic	3		0
710	G501	15	0	499.671	500.088	98.001	lithic	3		0
711	G501	16	0	499.686	500.12	98.007	lithic	3		0
712	G501	17	0	499.672	500.137	98.005	lithic	3		0
718	G501	18	0	499.614	500.217	97.993	lithic	3		0
719	G501	19	0	499.535	500.285	97.96	lithic	3	bottom f3	0
720	G501	19	1	499.547	500.266	97.968	lithic	3	bottom f3	0
721	G501	19	2	499.543	500.274	97.969	lithic	3	bottom f3	0
722	G501	20	0	499.756	500.094	98.007	lithic	3	bottom f3	0
723	G501	21	0	499.871	500.142	98.013	lithic	3	bottom f3, handaxe	0
724	G501	21	1	499.759	500.057	97.997	lithic	3	bottom f3, handaxe	0
725	G501	21	2	499.808	500.011	97.997	lithic	3	bottom f3, handaxe	0
726	G501	21	3	499.82	500.067	98.031	lithic	3	bottom f3, handaxe	0
727	G501	22	0	499.677	500.154	98.003	lithic	3	bottom f3	0
733	G501	23	0	499.578	500.316	97.965	lithic	3	bottom f3	0
734	G501	24	0	499.861	500.464	98.055	lithic	3		0
735	G501	24	1	499.888	500.46	98.063	lithic	3		0
736	G501	24	2	499.891	500.425	98.049	lithic	3		0
737	G501	24	3	499.851	500.422	98.037	lithic	3		0
738	G501	24	4	499.873	500.441	98.07	lithic	3		0
115	G502	3	0	499.763	500.631	98.087	lithic	2	burnt	0
684	G502	10	0	499.512	500.537	97.931	lithic	3-4	handaxe, mislabelled in photos as F502 ID87	0
685	G502	10	1	499.568	500.504	97.939	lithic	3-4	handaxe, mislabelled in photos as F502 ID87	0

686	G502	10	2	499.544	500.443	97.955	lithic	3-4	handaxe, mislabelled in photos as F502 ID87	0
687	G502	10	3	499.485	500.429	97.939	lithic	3-4	handaxe, mislabelled in photos as F502 ID87	0
688	G502	10	4	499.527	500.455	97.992	lithic	3-4	handaxe, mislabelled in photos as F502 ID87	0
728	G502	11	0	499.605	500.525	98.01	lithic	3	bottom f3	0
729	G502	11	1	499.697	500.522	98.02	lithic	3	bottom f3	0
730	G502	11	2	499.607	500.496	98.001	lithic	3	bottom f3	0
731	G502	11	3	499.692	500.487	98.009	lithic	3	bottom f3	0
732	G502	11	4	499.651	500.499	98.037	lithic	3	bottom f3	0
739	G502	12	0	499.721	500.774	98.067	lithic	3		0
740	G502	12	1	499.702	500.757	98.058	lithic	3		0
741	G502	12	2	499.664	500.783	98.067	lithic	3		0
742	G502	12	3	499.658	500.748	98.083	lithic	3		0
743	G502	13	0	499.675	500.962	98.096	lithic	3		0
744	G502	13	1	499.715	500.915	98.09	lithic	3		0
745	G502	13	2	499.696	500.926	98.088	lithic	3		0
746	G502	13	3	499.688	500.914	98.113	lithic	3		0
747	G502	14	0	499.923	500.786	98.107	lithic	3		0
748	G502	14	1	499.895	500.727	98.103	lithic	3		0
749	G502	14	2	499.96	500.724	98.111	lithic	3		0
750	G502	14	3	499.956	500.771	98.111	lithic	3		0
751	G502	14	4	499.925	500.742	98.129	lithic	3		0
758	G502	15	0	499.892	500.859	98.098	lithic	3		0
759	G502	15	1	499.907	500.855	98.102	lithic	3		0
760	G502	15	2	499.893	500.849	98.108	lithic	3		0
761	G502	16	0	499.967	500.914	98.116	lithic	3		0

Spatial Coordinates for Geological and Dating Samples

Micromorphology

Rec No	UNIT	ID	SUFF.	X	Y	Z	F	Comment
517	E502	2	0	498.946	500.75	97.557		WW11-07
518	E502	3	0	498.923	500.723	97.388		WW05-06
514	E503	1	0	498.984	501.354	97.361	3	WW05-5
429	F500	7	0	499.199	499.995	97.865	5	

603	F500	10	0	499.367	499.93	97.701		collapsed block on corner of section
604	F500	10	1	499.31	499.881	97.56		collapsed block on corner of section
435	F501	59	0	499.321	500.016	97.903	5	
436	F501	60	0	499.214	500.138	97.883	5	
437	F501	60	1	499.191	500.162	97.922	5	
438	F501	61	0	499.407	500.061	97.895	5	
443	F501	64	0	499.35	500.181	97.893	5	
444	F501	65	0	499.356	500.295	97.893	5	
519	F501	70	0	499.108	500.296	97.689		WW11-06
565	F501	74	0	499.156	500.293	97.849	5/7	
566	F501	74	1	499.203	500.082	97.813	5/7	
567	F501	74	2	499.283	500.311	97.858	5/7	
568	F501	74	3	499.187	500.214	97.889	5/7	
569	F501	75	0	499.404	500.346	97.837	5/7	
570	F501	75	1	499.304	500.184	97.874	5/7	
571	F501	75	2	499.325	500.317	97.847	5/7	
572	F501	75	3	499.332	500.25	97.9	5/7	
583	F501	80	0	499.207	500.127	97.742	7	
584	F501	80	1	499.267	499.926	97.728	7	
585	F501	80	2	499.157	500.068	97.708	7	
586	F501	80	3	499.217	500.052	97.823	7	
515	F502	55	0	499.018	500.908	97.738		WW05-2
516	F502	55	1	499.015	500.923	97.84		WW05-2
762	F502	91	0	499.025	500.91	97.829	5/7	
763	F502	91	1	499.026	500.925	97.941	5/7	
335	G500	6	0	499.64	499.884	97.62		WW11/15
337	G500	8	0	499.69	499.933	97.549		WW11/11a
338	G500	9	0	499.66	499.916	97.486		WW11/11
376	G500	13	0	499.789	499.966	96.239		WW11/04
399	G500	17	0	499.773	499.964	96.436		WW11/4
400	G500	17	1	499.775	499.971	96.515		WW11/4
401	G500	18	0	499.841	499.995	96.623		WW11/01
402	G500	18	1	499.838	500.037	96.657		WW11/01
403	G500	19	0	499.675	499.889	96.943		WW11/05
404	G500	19	1	499.691	499.91	97.029		WW11/05
375	G501	10	0	499.854	500	96.411		WW11/01
691	G501	12	0	499.52	500.464	97.932	4	below G502 ID10
405	G502	8	0	499.594	500.518	98.094	1-4	
406	G502	8	1	499.583	500.47	97.992	1-4	
319	H500	2	0	500.097	499.942	97.973		WW11/25
320	H500	2	1	500.155	499.955	97.971		WW11/25
321	H500	2	2	500.152	499.944	97.869		WW11/25
322	H500	2	3	500.092	499.936	97.871		WW11/25
600	H500	26	0	500.057	499.952	97.987	3/4	

601	H500	26	1	500.038	499.927	97.899	3/4	
361	I500	18	0	500.508	499.929	96.895		WW11/02
362	I500	18	1	500.565	499.934	96.894		WW11/02
363	I500	18	2	500.574	499.932	97.009		WW11/02
364	I500	18	3	500.511	499.931	96.999		WW11/02
553	QQ464	1	0	491.717	481.733	100.69		WW11-15
						1		
554	QQ464	2	0	491.767	481.834	100.60		WW11-16
						8		
555	QQ464	3	0	491.797	481.747	100.43		WW11-17
						1		
557	QQ464	4	0	491.817	481.799	100.35		WW11-18
						4		
523	UU464	1	0	493.569	481.948	99.835		WW11-20
531	UU464	3	0	493.583	481.948	99.82		WW11-20
542	UU464	4	0	493.698	481.979	98.703		WW11-22
543	UU464	4	1	493.703	481.995	98.873		WW11-22
524	UU465	1	0	493.644	482.196	99.639		WW11-21
526	UU465	1	1	493.627	482.195	99.759		WW11-21
527	UU465	2	0	493.661	482.121	99.532		WW11-23
529	UU465	2	1	493.632	482.095	99.62		WW11-23
534	UU465	4	0	493.718	482.479	99.503		WW103-104
551	UU464	5	6	493.727	484.843	99.369	2	gravel

IR and ICPMS

Rec No	UNIT	ID	SU FF.	X	Y	Z	AREA	FIND	F	COMMENT
339	G500	10	0	499.922	499.869	97.326	1	icp		130
349	G500	11	0	499.923	499.868	97.325	1	icp		130
374	G500	12	0	499.969	499.901	96.386	1	icp		55
393	G500	14	0	499.855	499.861	96.283	1	icp		20
394	G500	15	0	499.938	499.894	96.395	1	icp		35
340	H500	8	0	500.296	499.918	97.518	1	icp		150
350	H500	11	0	500.009	499.873	97.11	1	icp		110
368	H500	13	0	500.321	499.897	96.521	1	icp		75
384	H500	17	0	500.457	499.877	96.13	1	icp		005
315	J500	3	0	501.07	499.974	97.985	1	icp		190
316	J500	4	0	501.179	499.987	97.795	1	icp		170
466	F502	32	0	499.228	500.708	97.96	1	ir	3	concretion on top of ID 33, bottom f3
332	G500	3	0	499.967	499.876	97.826	1	ir		27
673	G500	22	0	499.961	499.901	97.722	1	ir		WW13-ir03
674	G500	23	0	499.971	499.902	97.656	1	ir		WW13-ir04
675	G500	24	0	499.991	499.893	97.84	1	ir		WW13-ir05, bourrow

676	G500	25	0	499.869	499.892	97.817	1	ir		WW13-ir06
318	H500	1	0	500.319	499.918	98	1	ir		29
325	H500	4	0	500.359	499.907	97.806	1	ir		26
341	H500	9	0	500.447	499.924	97.532	1	ir		22
342	H500	10	0	500.497	499.918	97.466	1	ir		21
671	H500	27	0	500.287	499.924	97.88	1	ir		WW13-ir01
672	H500	28	0	500.375	499.964	97.738	1	ir		WW13-ir02, coprolite?
677	H500	29	0	500.08	499.869	97.773	1	ir		WW13-ir07
323	I500	2	0	500.578	499.932	97.867	1	ir		28
326	I500	3	0	500.633	499.933	97.793	1	ir		25
327	I500	4	0	500.621	499.958	97.733	1	ir		24
328	I500	5	0	500.573	499.956	97.685	1	ir		23
343	I500	6	0	500.62	499.935	97.433	1	ir		20
345	I500	8	0	500.515	499.908	97.379	1	ir		19
347	I500	10	0	500.697	499.951	97.319	1	ir		18
348	I500	11	0	500.675	499.909	97.233	1	ir		17
355	I500	12	0	500.642	499.943	97.147	1	ir		15
356	I500	13	0	500.701	499.929	97.075	1	ir		14
357	I500	14	0	500.623	499.923	97.025	1	ir		13
358	I500	15	0	500.604	499.938	96.991	1	ir		12
359	I500	16	0	500.627	499.934	96.983	1	ir		11
360	I500	17	0	500.748	499.928	96.988	1	ir		10
365	I500	19	0	500.597	499.917	96.891	1	ir		9
366	I500	20	0	500.644	499.914	96.776	1	ir		8
367	I500	21	0	500.612	499.911	96.712	1	ir		7
379	I500	23	0	500.631	499.912	96.368	1	ir		06
380	I500	24	0	500.741	499.912	96.289	1	ir		05
381	I500	25	0	500.675	499.91	96.346	1	ir		04
382	I500	26	0	500.625	499.91	96.403	1	ir		03
383	I500	27	0	500.584	499.877	96.1	1	ir		01
678	I500	37	0	500.998	499.959	97.791	1	ir		WW13-ir08, burrow

OSL

RecNo	UNIT	ID	SUFFIX	X	Y	Z	AREA	FIND	F	COMMENT
385	H500	18	0	500.372	499.9	96.061	1	osl		WWd/1
386	H500	18	1	500.312	499.895	96.053	1	osl		WWd/1
387	H500	18	2	500.315	499.917	96.09	1	osl		WWd/1
388	H500	18	3	500.371	499.924	96.09	1	osl		WWd/1
305	J500	1	0	501.495	499.935	96.892	1	osl		WWd2
306	J500	1	1	501.49	499.941	96.964	1	osl		WWd2
457	K489	1	0	501.552	494.135	98.9	1	osl		WW d 21
458	K489	1	1	501.555	494.098	98.975	1	osl		WW d 21
309	K500	4	0	501.637	499.994	97.798	1	osl		WWd4
310	K500	4	1	501.634	499.99	97.874	1	osl		WWd4
307	K501	1	0	501.569	500.012	97.414	1	osl		WWd3

308	K501	1	1	501.567	500.022	97.474	1	osl		WWd3
520	L509	1	0	502.088	504.005	99.159	1	osl		WW d 22
521	L509	1	1	502.088	504.004	99.245	1	osl		WW d 22
455	M489	1	0	502.847	494.314	98.704	1	osl		WW d 20
456	M489	1	1	502.852	494.302	98.801	1	osl		WW d 20
558	QQ464	5	0	491.841	481.962	100.443	2	osl		WW d 17
559	QQ464	5	1	491.832	481.95	100.515	2	osl		WW d 17
530	UU464	2	0	493.623	481.899	99.537	2	osl		WW d 15
539	UU465	5	0	493.758	482.467	98.762	2	osl		WW d 14
540	UU465	5	1	493.746	482.433	98.807	2	osl		WW d 14
535	UU466	1	0	493.68	482.667	99.577	2	osl		WW d 16
536	UU466	1	1	493.661	482.651	99.67	2	osl		WW d 16

Paleomag

Rec No	UNIT	ID	SUF	X	Y	Z	AREA	FIND	F	COMMENT
333	G500	4	0	499.831	499.893	97.783	1	palaeomag		211-212
336	G500	7	0	499.628	499.873	97.573	1	palaeomag		82, 84
422	G500	20	0	499.999	499.897	96.556	1	palaeomag		9-10, no tag
427	G500	21	0	499.927	499.895	96.159	1	palaeomag		1, no tag, approx
329	H500	5	0	500.309	499.946	97.648	1	palaeomag		85, 78, 79
331	H500	7	0	500.031	499.931	97.67	1	palaeomag		80,81
409	H500	20	0	500.409	499.946	97.77	1	palaeomag		37, no tag
410	H500	21	0	500.444	499.939	97.782	1	palaeomag		36, no tag
423	H500	22	0	500.001	499.909	96.391	1	palaeomag		7-8, no tag
425	H500	23	0	500.311	499.91	96.34	1	palaeomag		5-6, no tag
426	H500	24	0	500.251	499.899	96.258	1	palaeomag		3-4, no tag
428	H500	25	0	500.015	499.884	96.201	1	palaeomag		2, no tag, approx
346	I500	9	0	500.58	499.931	97.352	1	palaeomag		23-24
407	I500	28	0	500.801	499.954	97.878	1	palaeomag		39, no tag
408	I500	29	0	500.891	499.978	97.885	1	palaeomag		38, no tag
411	I500	30	0	500.971	499.969	97.454	1	palaeomag		30, no tag
416	I500	31	0	500.628	499.954	97.096	1	palaeomag		21-22, no tag
417	I500	32	0	500.712	499.937	96.982	1	palaeomag		19-20, no tag
418	I500	33	0	500.715	499.945	96.847	1	palaeomag		17-18, no tag
419	I500	34	0	500.754	499.92	96.737	1	palaeomag		15-16, no tag
420	I500	35	0	500.629	499.924	96.599	1	palaeomag		13-14, no tag
421	I500	36	0	500.669	499.92	96.518	1	palaeomag		11-12, no tag
412	J500	5	0	501.012	499.973	97.464	1	palaeomag		27, no tag
413	J500	6	0	501.071	499.973	97.465	1	palaeomag		28, no tag
414	J500	7	0	501.106	499.986	97.546	1	palaeomag		29, no tag

415	J500	8	0	501.146	499.98	97.552	1	palaeomag	31, no tag
450	K493	1	0	501.755	496.496	96.252	1	palaeomag	94-95
454	K493	2	0	501.502	496.193	96.132	1	palaeomag	92-93
449	K494	1	0	501.757	496.583	96.458	1	palaeomag	96-97
451	K494	2	0	501.815	496.665	96.175	1	palaeomag	204
452	K494	3	0	501.796	496.684	96.161	1	palaeomag	203
453	K494	4	0	501.772	496.526	96.132	1	palaeomag	98
278	K498	1	0	501.881	498.692	97.581	1	palaeomag	WW53
282	K498	5	0	501.823	498.938	97.746	1	palaeomag	WW34-35
283	K498	6	0	501.831	498.926	97.648	1	palaeomag	WW32-33
284	K499	1	0	501.792	499.011	97.683	1	palaeomag	WW86-87
285	K499	2	0	501.784	499.085	97.633	1	palaeomag	WW88-89
286	K499	3	0	501.822	499.091	97.733	1	palaeomag	W201
287	K499	4	0	501.82	499.164	97.718	1	palaeomag	W202
288	K499	5	0	501.777	499.228	97.632	1	palaeomag	90-91
289	K499	6	0	501.751	499.314	97.645	1	palaeomag	71
290	K499	7	0	501.758	499.349	97.66	1	palaeomag	72
291	K499	8	0	501.767	499.335	97.698	1	palaeomag	73
292	K499	9	0	501.768	499.333	97.729	1	palaeomag	74
293	K499	10	0	501.77	499.295	97.727	1	palaeomag	75
294	K499	11	0	501.78	499.244	97.754	1	palaeomag	77
295	K499	12	0	501.77	499.275	97.812	1	palaeomag	76
296	K499	13	0	501.786	499.478	97.478	1	palaeomag	W25-26
297	K500	1	0	501.792	499.585	97.479	1	palaeomag	66-67
298	K500	2	0	501.781	499.665	97.531	1	palaeomag	68
299	K500	3	0	501.793	499.561	97.555	1	palaeomag	69
533	UU46 5	3	0	493.663	482.287	99.689	2	palaeomag	W105-106
541	UU46 5	6	0	493.755	482.239	98.859	2	palaeomag	101-102
279	K498	2	0	501.889	498.809	97.61	1	paleomag	WW50-51, WW 54-57
280	K498	3	0	501.848	498.803	97.692	1	paleomag	WW52
281	K498	4	0	501.838	498.825	97.763	1	paleomag	WW58-60

Cosmogenic

RecNo	UNIT	ID	SUFFIX	X	Y	Z	AREA	FIND	F	COMMENT
395	G500	16	0	499.823	499.881	96.304	1	cosmo		2
396	G500	16	1	499.728	499.883	96.323	1	cosmo		2
397	G500	16	2	499.726	499.938	96.392	1	cosmo		2
398	G500	16	3	499.849	499.926	96.402	1	cosmo		2
351	H500	12	0	500.417	499.913	97.056	1	cosmo		4
352	H500	12	1	500.422	499.927	97.142	1	cosmo		4
353	H500	12	2	500.614	499.959	97.132	1	cosmo		4
354	H500	12	3	500.61	499.937	97.061	1	cosmo		4

369	H500	14	0	500.104	499.912	96.482	1	cosmo	3
370	H500	14	1	500.276	499.898	96.495	1	cosmo	3
371	H500	14	2	500.261	499.918	96.562	1	cosmo	3
372	H500	14	3	500.082	499.897	96.557	1	cosmo	3
389	H500	19	0	500.388	499.878	96.074	1	cosmo	1
390	H500	19	1	500.191	499.896	96.054	1	cosmo	1
391	H500	19	2	500.191	499.945	96.126	1	cosmo	1
392	H500	19	3	500.349	499.899	96.195	1	cosmo	1
311	J500	2	0	501.353	499.967	97.804	1	cosmo	6
312	J500	2	1	501.22	499.997	97.777	1	cosmo	6
313	J500	2	2	501.238	500.01	97.816	1	cosmo	6
314	J500	2	3	501.321	499.993	97.863	1	cosmo	6
300	K499	14	0	501.773	499.292	97.457	1	cosmo	5
302	K499	14	1	501.769	499.277	97.533	1	cosmo	5
303	K499	14	2	501.797	499.421	97.504	1	cosmo	5
304	K499	14	3	501.804	499.42	97.44	1	cosmo	5

Spatial Coordinates for Faunal Samples

Rec No	UNIT	ID	SUFFIX	X	Y	Z	AREA	FIND	F	COMMENT
7	F501	1	0	499.236	500.465	98.077	1	bone	2	
86	F501	10	0	499.128	500.235	97.931	1	bone	3	
252	F501	51	0	499.148	500.298	97.899	1	bone	4	
592	F501	83	0	499.326	500.078	97.825	1	bone	7	
595	F501	86	0	499.335	500.143	97.813	1	bone	7	
74	F502	16	0	499.063	500.919	97.975	1	microfauna	3	prov. approx.
575	F501	77	0	499.35	500.025	97.852	1	tooth	7	
591	F501	82	0	499.335	500.198	97.819	1	tooth	7	