Archeological Survey and Site Distribution in Relation to Terrain Units

Susitna Hydroelectric Project

University of Alaska Museum

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1 - Introduction

At the request of the Alaska Power Authority, a study was undertaken to quantify the intensity of archeological survey and site occurrence by terrain unit in direct impact areas of the Susitna Hydroelectric Project. This report describes the methodology and the results of the terrain unit analysis. Only sites that fall within the boundaries of specific project features and facilities and were recorded and tested as part of the University of Alaska field program (253 sites) are considered in the analysis, however a listing of all sites by terrain unit is provided in Table 13.

2 - Methodology

2.1 - Terrain Unit Mapping

Terrain unit mapping for the Susitna Hydroelectric Project was conducted by R & M Consultants, Inc. (1981) and based upon geological interpretation of airphoto mosaics with some ground-truthing. The terrain unit is a geomorphological term which is used to denote landforms occurring from the ground surface to a depth of about 25 feet (R & M Consultants, Inc. 1981:i). A total of 26 terrain units were identified and delineated on photomosaic base maps, which were reproduced as diazo copies at a scale of 1:24000. Terrain units were assigned symbols which reflect the genetic origin of the deposit (e.g., G represents a glacial origin and C represents a colluvial origin), as well as other specific information about the landform. Compound terrain units were created for areas where the surficial exposure patterns of two landforms were so complexly related that they had to be mapped as one unit. Most of the terrain units have been described by R & M Consultants in terms of their topography, distribution, slope, drainage, permeability, and other attributes pertinent to engineering concerns. Terrain unit description and a list of properties which may be related to archeological site occurrence appear in Table 1.

The first step in measuring the areal extent of terrain units within the project area was the preparation of mylar overlays for the R & M terrain unit maps. Of the 18 terrain unit map sheets prepared by R & M Consultants, only those covering the impoundments, construction facilities, and borrow areas were used in this study. They include sheets 3, 4, 5, 7, 8, 9, 10, 11, 12, and 13. Initially, the channel of the Susitna River, major tributaries, and other hydrologic features were traced from the photomosaic base onto the overlay. The impoundment limit contours were mapped on the overlays by using vegetation maps prepared by the University of Alaska Agricultural Experiment Station (1980) at a scale of 1:24000, which is equivalent to that of the terrain unit base maps. The 1500 foot contour was used as the impoundment limit for the Devil Reservoir, and the 2200 foot contour was used as the impoundment limit for the Watana Reservoir. Construction facilities in the vicinity of the Devil and Watana campsites and borrow areas occurring outside the impoundment limits were noted using maps prepared by Acres American (1983). The terrain units falling within the impoundment limits, construction facilities and borrow areas were then traced onto the overlay.

Areal extent of terrain units was determined using a Lasico model L-30 adjustable mechanical planimeter. A conversion factor of 0.5028 hectares/unit, to be applied to the planimeter unit values, was determined by measuring a known area as follows:

$$\text{Actual ground area} = \frac{\text{Test area}}{\text{Planimeter value}} \times (\text{Scale factor})^2$$

Calibrated test area: 81.48 sq. cm

Planimeter value: 933.5 units

Scale factor: 24000

$$\text{Actual ground area} = \frac{81.48 \text{ sq. cm}}{933.5 \text{ units}} \times (2400)^2 = 50280000 \text{ sq. cm/unit}$$

$$= 5028 \text{ sq. m/unit} = 0.5028 \text{ ha/unit}$$

The methods for planimeter use followed those outlined by Brinker and Wolf (1977).

In measuring the terrain units, the individual units were given a reference number and the measured area was recorded according to that number. Individual terrain units of the same class were summed for each impoundment, construction facility area, and borrow area outside the impoundments and construction areas to gain a measure for areas occupied by each class within these features. The classes were in turn added together to obtain the total terrain area within each of these features. It was not possible to determine terrain unit coverage in Borrow C or for the northernmost 179.75 ha of Borrow F as terrain units had not been mapped in these area.

2.2 - Mapping of Survey Areas for Cultural Resources

The area to be impacted by Susitna Hydroelectric Project features and facilities was subdivided into units called survey locales (Dixon et al. 1985:6-5). Field personnel concentrated their survey efforts within survey locales and other project-defined areas, such as borrow sites. Areas outside of survey locale boundaries were considered to have low archeological potential and thus were eliminated from survey. These low/no potential areas are characterized by steep slopes exceeding 15°, areas of standing water such as lakes, bogs, and muskeg, and the active channels and gravel bars of the Susitna River and its tributaries. Areas encompassed by survey locales contained terrain likely to hold potential for archeological site occurrence, preservation and discovery, i.e., high topographic relief, well-drained soil, and proximity to streams, rivers, or lakes, but included some areas of low/no potential as well.

In order to derive a measure of the surveyable area within each terrain unit class, survey locale boundaries were first traced onto the terrain unit overlays. Survey locale boundaries were originally plotted on air photo overlays used during archeological fieldwork. The air photos used in fieldwork were the same as those used to construct the photomosaic base maps, and thus the scales were equivalent. In some instances, survey transects recorded on the overlays occurred outside of survey locale boundaries. This happened, for example, when field crews located features having archeological potential adjacent to the survey locales as initially defined. In such cases the survey locale boundaries were extended to include these areas. The surveyable area was thus defined as the area included within the impoundments, construction areas, and borrow areas A, C, F, H, and K and enclosed within the combined survey locale boundaries. Areas of individual terrain units falling within the "surveyable" category were measured with the planimeter and then summed to gain a total surveyable area for each terrain unit class. The total surveyable area for each project feature or facility was obtained by summing the area of all terrain unit classes within it.

The percentage of surveyable terrain that actually received intensive field survey was calculated. The airphoto overlays that delimited survey locale boundaries also contained a record of the transect lines covered during the course of each survey. In the case of fieldwork conducted prior to 1981, when aerial photography of the project area became available, survey transects were plotted directly on survey locale maps (Dixon et al. 1985: Appendix E). These transects were transferred from the survey locale maps to the airphoto overlays as accurately as possible. The airphoto overlays were used in conjunction with the terrain unit maps to determine the areal extent of surveys conducted within each terrain unit class. The length of each transect within an individual terrain unit was measured with a map measuring wheel. This value was converted to a ground distance value according to the nominal scale of 1:24000.

In order to determine the extent of the area surveyed, an approximate value representing the width of the area searched on a given survey

swath was required. Since each swath crossed features of high archeological potential, which were surveyed intensively, and intervening low potential areas that received less coverage, a single value was not considered adequate to represent transect width. Therefore, the survey area was calculated twice, using estimated widths of both 30 m and 60 m. When these figures were multiplied by transect length, two measurements of the area surveyed were derived. These measurements represent the upper and lower limits for transect coverage within any given terrain unit.

2.3 - Limitations of the Study

Before interpreting the results of terrain unit analysis, a discussion of some of the limitations of this study must be presented. The first limitation involves errors in the mapping scale which slightly affect terrain unit measurements. It was found that the scale of 1:24000 was not constant on the airphotos and photomosaics prepared from them because of varying camera elevations, misalignment during photomosaic construction, and distortions introduced during the reproduction of the terrain unit maps. Scale factor error resulting from image displacement is a function of the amount of variation in elevation of the terrain being photographed. The actual scale for a given point can be determined using the following formula (Wolf 1983):

$$\text{Scale} = \frac{f}{(H-h)} = \frac{f}{H'}$$

where: f = focal length of the camera lens
H = flying height of the camera
h = ground or object elevation
H' = object distance from the camera

Example: if f = 0.5 ft., H = 13970 ft. and h = 2200 ft., then

$$\text{Scale} = \frac{0.5 \text{ ft.}}{(13970 \text{ ft.} - 2220 \text{ ft.})} = \frac{0.5 \text{ ft.}}{11770 \text{ ft.}} = \frac{1}{23540} = 1:23540$$

For the purposes of this study a 6 in. (0.5 ft.) focal length was assumed, while the flying height of the camera was taken from altimeter

readings recorded on each airphoto. For the object elevation the upper impoundment limit and the lowest point on the photograph were used as the highest and lowest elevations, respectively.

For the Devil Reservoir the scale varied between a maximum at the impoundment limit of 1:24460 and a minimum at the lowest elevation of 1:25280, with an average of 1:24570. Relative to the nominal scale of 1:24000 the actual scale varied between 0.6% and 5.3% smaller, with the average being 2.4% smaller. For the Watana Reservoir the scale varied between a maximum of 1:23020 and a minimum of 1:24920, with the average being 1:24020. This was between 4.1% larger and 1.0% smaller than 1:24000, while the average was 0.08% larger.

Additional error can be expected to be present in the photomosaics, depending on construction procedures. The mosaics appear to be either uncontrolled or semicontrolled (i.e., ground control and ratioing and rectification of airphotos were not rigorously used during construction), with image details serving as the principal means of aligning photographs. As a result, distances may vary greatly and randomly in crossing the matching lines between photographs relative to the actual scale. The diazo reproduction process can also be expected to introduce further error since a 1:1 enlargement ratio will not necessarily be maintained, and, in fact, the linear distortion may be greater in one direction than another.

These sources of error cannot be mathematically modeled so a series of measurements were taken to gain some idea of the actual amount of error to be expected. Measurements were made between prominent features recognizable on both the photomosaics and U.S.G.S. quadrangles for each of the terrain unit maps used. These values were then converted to actual ground distance, using the nominal scale of 1:24000 for the photomosaic measurements. The variation between the distance obtained from the terrain unit maps and the correct distance as obtained from the topographic maps was then expressed as a percentage. From a sample of 20 measurements the average error was +1.2% ± 7.1% at one standard deviation for the Devil Reservoir, with the greatest single error value

being ±15.9%. For the Watana Reservoir this average was -0.6% ± 5.6%, with the greatest single error value being -13.4%. The combined average for both reservoirs was +0.1% ± 6.7%.

The second limitation of the study involves the difficulty in deriving a value which represents the width of a survey swath which can be used to measure actual coverage. Even though the same general procedures for recording transects were used by all crews in the field, many factors may have affected the actual width of the swath being walked. For example, rugged terrain may have physically restricted wide spacing between individual crew members, and thus the survey swath width could have been less than the estimated 30 - 60 meters. On the other hand, if the terrain permitted the surveyors to spread out and cover the area by "zig-zagging" along the survey route, the width of the swath could have been effectively increased to 100 m or more. Also, the number of people comprising a field crew bears directly on the width of the swath. In most cases the crew was comprised of three people, but the number sometimes varied from two to four. Therefore, it should be stressed that although 30 - 60 m is a reasonable swath width, it is still only an estimate for a parameter that is very difficult to accurately measure.

Another limitation of the study that could affect potential correlations between site occurrence and terrain unit is the variability within each terrain unit class. Topography, vegetation, and soil conditions are not homogenous within the boundaries of a given terrain unit. In fact, specific locales that hold high archeological potential, such as areas of high topographic relief or areas in close proximity to stream and river confluences, may actually cross-cut terrain unit boundaries. This internal variability is important to consider when attempting to discover patterns of archeological site occurrence by terrain unit analysis.

3. - Results

Tables 2-10 present the results of terrain unit measurements and transect coverage in the Watana impoundment, Watana construction area, Devil impoundment, Devil construction area, and in Borrows A, C, F, H, and K, respectively. The greatest extent of surveyable terrain (total hectares minus hectares eliminated from survey) was included within the Watana impoundment and totaled 8,452.63 hectares (Table 2). Surveyable terrain in the Watana and Devil construction areas was calculated as 1598.52 and 1298.00 hectares, respectively (Tables 3 and 5). Of the borrow areas not included within other categories, Borrow F included the largest areas of surveyable terrain, 454.02 hectares (Table 8), while Borrows H and K had no areas that were considered surveyable (Tables 9 and 10).

The percentage of surveyable terrain which received coverage was calculated twice for each of the project facilities and features discussed here. The first calculation was based on an estimated survey swath width of 30 m, and the second on a width of 60 m. The resulting percentages indicate the range of coverage in each of the project areas (Table 2-8). For example, Table 2 indicates that in the Watana impoundment, the range of coverage fell between 15.20% and 30.38% of the total hectares of surveyable terrain. When considering all project features and facilities, estimates of transect coverage were made for 49 individual terrain unit classes. In three cases in which the number of hectares was relatively small, 60 m was found to be an overestimate of survey swath width, and resulted in percentages of surveyed terrain equalling greater than 100%. One such overestimate was made for the small parcel of glacial outwash deposits (GFo) in the Watana impoundment. Only 7.04 hectares or .08% of the total surveyable hectares in the Watana impoundment was attributed to this terrain unit class. Underestimates of coverage were not as easily detectable, but may have occurred when 30 m was used to determine the extent of surveyed terrain.

The mosaic of terrain units is quite different for each of the project features and facilities discussed, as evident when comparing the hectare values for terrain units listed on Tables 2-10. In the Watana impoundment (Table 2), for example, frozen basal till (Gtb-f), lacustrine deposits over frozen basal till (L/Gtb-f), and colluvium over bedrock and exposed bedrock (C/Bxu + Bxu) are the best represented of the terrain unit classes. In comparison, the Watana construction area (Table 3) is comprised primarily of ablation till (Gta), ablation till over unweathered bedrock (Gta/Bxu), and organic deposits (O). The percentage of surveyable terrain in each terrain unit class varies considerably between features and facilities. This probably reflects the variability within each terrain unit in terms of surface morphology and vegetation, which in turn affects "surveyability". The difference in proportions of surveyable and unsurveyable terrain within a terrain unit class is best illustrated by comparing lacustrine over frozen basal till deposits (L/Gtb-f) in Borrows A and H. In Borrow A, 100% of this terrain unit was surveyable (Table 6), whereas in Borrow H, 100% of the same terrain unit was eliminated from survey (Table 9), as boggy areas were so extensive that helicopter landing and on-the-ground reconnaissance were impossible.

The distribution of sites by terrain unit and by project facility or feature is presented in Table 11. Only sites located within the Watana impoundment/construction area, Devil impoundment/construction area, and Borrows A, C, F, H, and K are enumerated on this table, however a complete list of sites by terrain unit is presented in Table 13. As expected on the basis of size in surveyable hectares, the Watana impoundment produced the majority of sites, 73 of the total 123. Eighteen were found in the Watana construction area and 17 in Borrow C, although all of the Borrow C sites occurred in areas unmapped for terrain units. Terrain characterized as lacustrine sediments over frozen basal till (L/Gtb-f) yielded the most sites, 28 or 22.76% of the total, and all were found in the Watana impoundment. Ablation till (Gta) and flood plain deposits (Fp) were the next most productive terrain units, yielding 14 and 13 sites, respectively. Nine other terrain unit classes produced sites, while 11 classes did not. Terrain units associated with

archeological sites were generally gentle to moderate in slope, and in many cases the drainage and permeability of the soil was good-high (good-high reflects R&M Consultants' terminology for soil drainage and permeability; R&M Consultants 1981 - Terrain unit maps). In some cases, permafrost was present. Terrain units which produced no sites were most often steep to near vertical in slope, with the soil drainage and permeability ranging from good-high to frozen. These descriptions, while valid on a broad scale, mask the internal variability within each terrain unit class.

Table 12 summarizes the results of terrain unit analysis. Of the 23,265.82 hectares included in all mapped project features and facilities, 13,509.19 hectares, or 58.06% of the total, were determined to be surveyable. However, in each of 11 individual terrain unit classes, the percentages of surveyable hectares exceeded 60% of the total hectares for that class. Since the percentage of surveyable hectares bears a direct relationship to the archeological potential of a terrain unit, these 11 classes may be considered to have a higher potential for the occurrence, discovery, and preservation of archeological sites than the remaining 12 terrain unit classes. The 11 classes with relatively high archeological potential are: solifluction deposits (Cs-f), flood plain terraces (Fpt), outwash deposits (GFo), eskers (GFe) kames (GFk), ablation till (Gta), lacustrine sediments over frozen basal till (L/Gtb-f), solifluction deposits over flood plain terraces (Cs-f/Fpt), solifluction deposits over bedrock (Cs-f/Bxu), frozen basal till over bedrock (Gtb-f/Bxu), and ablation till over bedrock (Gta/Bxu). For all terrain units, survey coverage ranged from 13.79% to 27.56% of the surveyable area based on estimated swath widths of 30 m and 60 m.

Table 12 also provides the percentage of total survey effort that was expended in each of the terrain unit classes. These figures were derived by dividing the hectares of surveyed area for a given class by the total number of hectares surveyed. For the 11 terrain units with relatively high archeological potential, the combined survey effort equaled 51.77% of the total. The 12 terrain units with lower potential received 44.77% of the total survey coverage, despite the fact that

these terrain units comprised 59.56% of the total number of hectares in the project area. Three of the lower potential classes were completely eliminated from survey. These percentages indicate that survey coverage reflects not only the total number of hectares of a given terrain unit class, but may also suggest the archeological potential of that class.

Site occurrence is also summarized on Table 12. Terrain unit classes with relatively high archeological potential produced 63, or 51.22% of the sites, whereas the classes with lower archeological potential produced 38, or 30.89% of the sites. The 38 sites occurred in only four terrain unit classes, i.e., alluvial fans (Ffg), flood plain deposits (Fp), frozen basal till (Gtt-f), and colluvium over bedrock and exposed bedrock (C/Bxu + Bxu). Five of the lower potential terrain unit classes that were surveyed proved to be culturally sterile. The remaining sites fell in areas outside of those mapped for terrain units (within Borrows C and F). Since only 3.46% of the survey effort was expended in these unmapped areas, the discovery of 22 sites (17.89% of the total) is quite significant.

Table 12 indicates that a good correlation exists between survey coverage and site discovery. As previously mentioned, the coverage given any terrain unit or portion of a terrain unit reflects its assessed potential for site occurrence, preservation and discovery. The highest percentage of sites (28 sites or 22.76% of the total) occurred in lacustrine deposits overlying frozen basal till (L/Gtb-f), which also received the greatest survey coverage (20.52%). On the opposite side of the spectrum, no sites were found in the five terrain units (C, Cl, Cs-f, Cs-f/Bxu, and C/Bxw + Bxw) that each received less than 1% of the total survey effort. Again, it should be stressed that the low survey coverage reflects both the small number of hectares and the low archeological potential of these particular terrain unit classes. The greatest discrepancy between survey coverage and site discovery occurred in the unmapped terrain of Borrows C and F, encompassing a narrow strip of land on either side of Tsusena Creek. A unique cluster of attributes, including a valley constriction, well-drained overlooks, and proximity

to streams, lakes, and stream confluences, characterizes this highly productive area.

In summary, the analysis has shown that although each terrain unit class is internally variable with respect to topography, vegetation, etc., it can be broadly characterized as either relatively high or low in archeological potential. Archeological survey in the group of terrain units which were assessed to be of higher archeological potential tended to produce more sites than those assessed to be of lower potential. As illustrated by the high occurrence of sites in the unmapped portions of Borrows C and F, the most important factors in site discovery are specific topographic features and/or environmental settings that, in many cases, cross-cut terrain unit boundaries.

Table 1. Terrain Unit Distribution and Properties (after R & M Consultants, 1981)

Terrain Unit Symbol	Name	Topography and Distribution	Slope	Drainage and Permeability	Ground Water Table
Bxu	Unweathered, consolidated bedrock	Cliffs, rounded knobs and mountain peaks	moderate to near vertical	--	deep
C	Colluvial deposits	Base of steep bedrock slopes	moderate to steep	good/high	deep
Cl	Landslide deposits	Unconsolidated deposits along Susitna River and major tributaries	moderate to steep	poor/low	shallow
Cs-f	Solifluction deposits	Smooth to lobate; formed by frequent freeze/thaw cycles	gentle to steep	frozen	shallow
Ffg	Granular alluvial fan	Cone-shaped deposits; formed where high gradient streams flow onto flat surfaces	moderate	good/high	shallow

Table 1. (Continued)

Terrain Unit Symbol	Name	Topography and Distribution	Slope	Drainage and Permeability	Ground Water Table
Fp	Floodplain deposits	Plains slightly above and adjacent to Susitna River and tributaries	flat to gentle	good/high	very shallow
Fpt	Terrace	Remnants of former floodplain above present floodplain	flat to gentle	good/high	deep
GFo	Outwash deposits	Bottoms of U-shaped valleys and adjacent to Susitna River	gentle	good/high	shallow to deep
GFe	Esker deposits	Rounded to sharp crested sinuous ridges	steep local slopes	good/high	deep
GFk	Kame deposits	Rounded to sharp crested hummocky hills	steep local slopes	good/high	deep
Gta	Ablation till	Valley side walls and bottoms between Tsusena and Deadman creeks	gentle to steep	moderate/ moderate	shallow to moderately deep

Table 1. (Continued)

Terrain Unit Symbol	Name	Topography and Distribution	Slope	Drainage and Permeability	Ground Water Table
Gtb-f	Basal till (frozen)	Bottoms of U-shaped valleys and adjacent gentle slopes	gentle to steep	frozen	shallow to deep
O	Organic deposits	Swales between small rises on lowlands; flat surface to steplike terrace	flat	poor/moderate to high	at surface
L-f	Lacustrines (frozen)	Lowlands (below 3000') in the Tyone - Oshetna River area	gentle	frozen	shallow
L/Gtb-f	Lacustrine over basal till	Lowlands (bleow 3000') between Stephan Lake and Watana Creek & upstream past Tyone River	gentle to moderate	lacustrine-good/ good; basal till-frozen	moderately deep
Cs-f/ Gtb-f	Solifluction deposits (frozen) over basal till (frozen)	--	--	--	--

Table I. (Continued)

Terrain Unit Symbol	Name	Topography and Distribution	Slope	Drainage and Permeability	Ground Water Table
Cs-f/Fpt	Solifluction deposits (frozen) over terrace sediments	Smooth to lobate flows of frozen fine-grained materials on terrace of Susitna River; frequent between Tyone & Oshetna rivers	gentle	frozen	shallow to deep
Cs-f/Bxu	Solifluction deposits (frozen) over bedrock	Steplike topography on mountain flanks north and south of Devil Canyon	moderate to steep	frozen	shallow
Gtb-f/ Bxu	Frozen basal till over bedrock	Rolling lowlands; river canyon walls	moderate to steep	frozen	shallow
Gta/Bxu	Ablation till over unweathered bedrock	Hummocky rolling surface transitional to mountains; adjacent to Deadman Creek	gentle to steep	good/high	shallow to moderately deep

Table 1. (Continued)

Terrain Unit Symbol	Name	Topography and Distribution	Slope	Drainage and Permeability	Ground Water Table
C/Bxu + Bxu	Colluvium over bedrock and bedrock exposures	Steep slopes along Susitna River and tributaries	steep to near vertical	good/low to moderate	deep
C/Bxw + Bxw	Colluvium over weathered poorly consolidated bedrock	Small cliffs in Tertiary sediments along Watana Creek & Tertiary volcanics in Fog Creek	steep to near vertical	good/low to moderate	deep
L/Bxu	Lacustrine sediment over unweathered, consolidated bedrock	--	--	--	--
F/Ft	--	--	--	--	--

Table 2. Transect Coverage by Terrain Unit in the Watana Impoundment

Terrain Unit	Total Hectares	Hectares Eliminated From Survey	Surveyable Area		Survey Coverage 30 m width		60 m width	
			Hectares	Percent	Hectares	Percent	Hectares	Percent
Bxu	--	--	--	--	--	--	--	--
C	23.13	3.02	20.11	86.94	.92	4.57	1.83	9.10
Cl	20.61	9.80	10.81	52.45	2.30	21.28	4.57	42.28
Cs-f	11.06	--	11.06	100.00	1.37	12.39	2.74	24.77
Ffg	465.62	195.60	270.02	57.99	67.75	25.09	135.36	50.13
Fp	802.69	492.22	310.47	38.68	61.31	19.75	122.59	39.49
Fpt	704.18	245.36	458.82	65.16	106.79	23.27	213.54	46.54
GFo	23.63	16.59	7.04	29.79	4.58	65.06	9.14	129.83
GFe	.50	--	.50	100.00	--	--	--	--
GFk	279.06	36.70	242.36	86.85	48.25	19.91	96.49	39.81
Gta	110.86	77.43	33.43	30.16	2.29	6.85	4.57	13.67
Gtb-f	5259.71	2580.60	2679.11	50.94	308.54	11.52	616.93	23.03
0	124.92	28.65	96.27	77.07	6.88	7.15	13.70	14.23
L-f	347.69	156.62	191.07	54.95	23.79	12.45	47.54	24.88
L/Gtb-f	2731.79	405.14	2326.65	85.17	355.82	15.29	711.50	30.58
Cs-f/Fpt	779.60	239.36	540.24	69.30	95.39	17.66	190.70	35.30
Cs-f/Bxu	64.11	1.76	62.35	97.25	6.64	10.65	13.28	21.30
Gtb-f/Bxu	196.23	33.56	162.67	82.90	23.10	14.20	46.19	28.39

Table 2. (Continued)

Terrain Unit	Total Hectares	Hectares Eliminated From Survey	Surveyable Area		Survey Coverage			
			Hectares	Percent	30 m width Hectares	30 m width Percent	60 m width Hectares	60 m width Percent
Gtn/Bxu	211.68	26.90	184.78	87.29	23.10	12.50	46.19	25.00
C/Bxu + Bxu	2035.56	1313.89	721.67	35.45	138.19	19.15	276.25	38.28
C/Bxw + Bxw	362.03	238.83	123.20	34.03	7.56	6.14	15.10	12.26
L/Bxu	--	--	--	--	--	--	--	--
F/Fpt	--	--	--	--	--	--	--	--
Totals:	14,554.66	6,102.03 (41.92%)	8,452.63 (58.08%)		1,284.57 15.20% 8.83%		2,568.21 30.38% of Surveyable 17.65% of Total	

Table 3. Transect Coverage by Terrain Unit in the Watana Construction Area

Terrain Unit	Total Hectares	Hectares Eliminated From Survey	Surveyable Area		Survey Coverage			
			Hectares	Percent	30 m width		60 m width	
					Hectares	Percent	Hectares	Percent
Bxu	--	--	--	--	--	--	--	--
C	--	--	--	--	--	--	--	--
Cl	--	--	--	--	--	--	--	--
Cs-f	--	--	--	--	--	--	--	--
Ffg	--	--	--	--	--	--	--	--
Fp	36.71	25.64	11.07	30.16	1.38	12.47	2.74	24.75
Fpt	15.58	2.77	12.81	82.22	.92	7.18	1.83	14.29
GFo	164.67	26.40	138.27	83.97	24.92	18.02	49.86	36.06
GFe	--	--	--	--	--	--	--	--
GFk	--	--	--	--	--	--	--	--
Gta	1087.55	40.98	1046.57	96.23	113.42	10.84	226.80	21.67
Gtb-f	5.78	--	5.78	100.00	--	--	--	--
G	194.08	10.44	183.64	94.62	11.91	6.49	23.77	12.94
L-f	--	--	--	--	--	--	--	--
L/Gtb-f	--	--	--	--	--	--	--	--
Cs-f/Fpt	--	--	--	--	--	--	--	--
Cs-f/Bxu	--	--	--	--	--	--	--	--
Gtb-f/Bxu	--	--	--	--	--	--	--	--

Table 3. (Continued)

Terrain Unit	Total Hectares	Hectares Eliminated From Survey	Surveyable Area		Survey Coverage			
			Hectares	Percent	30 m width		60 m width	
					Hectares	Percent	Hectares	Percent
Gta/Bxu	220.23	37.20	183.03	83.11	26.30	14.37	52.60	28.74
C/Bxu + Bxu	112.88	95.53	17.35	15.37	2.29	13.20	4.57	26.34
C/Bxw + Bxw	--	--	--	--	--	--	--	--
L/Bxu	--	--	--	--	--	--	--	--
F/Fpt	--	--	--	--	--	--	--	--
Totals:	1837.48	238.96 (13.00%)	1598.52 (87.00%)		181.14 11.33% 9.86%		362.17 22.66% of Surveyable 19.71% of Total	

Table 4. Transect Coverage by Terrain Unit in the Devil Impoundment

Terrain Unit	Total Hectares	Hectares Eliminated From Survey	Surveyable Area		Survey Coverage			
			Hectares	Percent	30 m width		60 m width	
					Hectares	Percent	Hectares	Percent
Bxu	15.59	15.59	--	--	--	--	--	--
C	19.61	16.59	3.02	15.40	0.46	15.23	0.91	30.13
Cl	--	--	--	--	--	--	--	--
Cs-f	--	--	--	--	--	--	--	--
Ffg	353.72	137.76	215.96	61.05	50.79	23.52	101.54	47.02
Fp	640.56	221.73	418.83	65.38	91.95	21.95	183.94	43.92
Fpt	150.59	47.77	102.82	68.28	16.25	15.80	32.46	31.57
GFo	4.53	4.53	--	--	--	--	--	--
GFe	--	--	--	--	--	--	--	--
GFk	--	--	--	--	--	--	--	--
Gta	--	--	--	--	--	--	--	--
Gtb-f	168.70	82.46	86.24	51.12	16.04	18.60	32.00	37.11
O	1.01	1.01	--	--	--	--	--	--
L-f	--	--	--	--	--	--	--	--
L/Gtb-f	--	--	--	--	--	--	--	--
Cs-f/Fpt	63.35	36.20	27.15	42.86	9.60	35.36	19.20	70.72
Cs-f/Bxu	--	--	--	--	--	--	--	--
Gtb-f/Bxu	280.29	258.40	21.89	7.81	4.12	18.82	8.22	37.55

Table 4. (Continued)

Terrain Unit	Total Hectares	Hectares Eliminated From Survey	Surveyable Area		Transect Coverage			
			Hectares	Percent	30 m width		60 m width	
					Hectares	Percent	Hectares	Percent
Gta/Bxu	--	--	--	--	--	--	--	--
C/Bxu + Bxu	1264.78	987.99	276.79	21.88	26.33	9.51	52.57	18.99
C/Bxw + Bxw	--	--	--	--	--	--	--	--
L/Bxu	1.76	1.76	--	--	--	--	--	--
F/Fpt	17.10	17.10	--	--	--	--	--	--
Totals:	2981.59	1828.89	1152.70		215.54		430.84	
		(61.34%)	(38.66%)		18.70%		37.38% of Surveyable	
					7.23%		14.45% of Total	

Table 5. Transect Coverage by Terrain Unit in the Devil Construction Area

Terrain Unit	Total Hectares	Hectares Eliminated From Survey	Surveyable Area		Survey Coverage			
			Hectares	Percent	30 m width		60 m width	
					Hectares	Percent	Hectares	Percent
Bxu	56.56	56.56	--	--	--	--	--	--
C	189.80	189.80	--	--	--	--	--	--
Cl	--	--	--	--	--	--	--	--
Cs-f	--	--	--	--	--	--	--	--
Ffg	50.28	50.28	--	--	--	--	--	--
Fp	--	--	--	--	--	--	--	--
Fpt	--	--	--	--	--	--	--	--
GFo	--	--	--	--	--	--	--	--
GFe	--	--	--	--	--	--	--	--
GFk	--	--	--	--	--	--	--	--
Gta	--	--	--	--	--	--	--	--
Gtb-f	591.80	--	591.80	100.00	--	--	--	--
O	248.80	248.80	--	--	--	--	--	--
L-f	--	--	--	--	--	--	--	--
L/Gtb-f	--	--	--	--	--	--	--	--
Cs-f/Fpt	--	--	--	--	--	--	--	--
Cs-f/Bxu	--	--	--	--	--	--	--	--
Gtb-f/Bxu	731.08	28.41	702.67	96.11	4.39	0.62	8.78	1.25

Table 5. (Continued)

Terrain Unit	Total Hectares	Hectares Eliminated From Survey	Surveyable Area		Survey Coverage			
			Hectares	Percent	30 m width		60 m width	
					Hectares	Percent	Hectares	Percent
Gta/Bxu	--	--	--	--	--	--	--	--
C/Bxu + Bxu	278.31	274.78	3.53	1.27	--	--	--	--
C/Bxw + Bxw	--	--	--	--	--	--	--	--
L/Bxu	--	--	--	--	--	--	--	--
F/Fpt	--	--	--	--	--	--	--	--
Totals:	2146.63	848.63 (39.53%)	1298.00 (60.47%)		4.39 0.34% 0.20%		8.78 0.68% of Surveyable 0.41% of Total	

Table 6. Transect Coverage by Terrain Unit in Borrow A

Terrain Unit	Total Hectares	Hectares Eliminated From Survey	Area Surveyable		Survey Coverage			
			Hectares	Percent	30 m width		60 m width	
					Hectares	Percent	Hectares	Percent
Bxu	--	--	--	--	--	--	--	--
C	--	--	--	--	--	--	--	--
Cl	--	--	--	--	--	--	--	--
Cs-f	--	--	--	--	--	--	--	--
Ffg	--	--	--	--	--	--	--	--
Fp	--	--	--	--	--	--	--	--
Fpt	--	--	--	--	--	--	--	--
GFo	--	--	--	--	--	--	--	--
GFe	--	--	--	--	--	--	--	--
GFk	--	--	--	--	--	--	--	--
Gta	--	--	--	--	--	--	--	--
Gtb-f	--	--	--	--	--	--	--	--
O	--	--	--	--	--	--	--	--
L-f	--	--	--	--	--	--	--	--
L/Gtb-f	80.70	--	80.70	100.00	26.30	32.59	52.60	65.18
Cs-f/Fpt	--	--	--	--	--	--	--	--
Cs-f/Bxu	--	--	--	--	--	--	--	--
Gtb-f/Bxu	81.20	-0-	81.20	100.00	42.98	52.93	85.96	105.86

Table 6. (Continued)

Terrain Unit	Total Hectares	Hectares Eliminated From Survey	Surveyable Area		Survey Coverage			
			Hectares	Percent	30 m width		60 m width	
					Hectares	Percent	Hectares	Percent
Gta/Bxu	--	--	--	--	--	--	--	--
C/Bxu + Bxu	13.58	--	13.58	100.00	6.86	50.52	13.72	101.03
C/Bxw + Bxw	--	--	--	--	--	--	--	--
L/Bxu	--	--	--	--	--	--	--	--
F/Fpt	--	--	--	--	--	--	--	--
Totals:	175.48	-0-	175.48		76.14		152.28	
			(100.00%)		43.39%		86.78% of Surveyable	
					43.39%		86.78% of Total	

Table 7. Transect Coverage by Terrain Unit in Borrow C

Terrain Unit	Total Hectares	Hectares Eliminated From Survey	Surveyable Area		Survey Coverage			
			Hectares	Percent	30 m width		60 m width	
					Hectares	Percent	Hectares	Percent
Bxu	--	--	--	--	--	--	--	--
C	--	--	--	--	--	--	--	--
Cl	--	--	--	--	--	--	--	--
Cs-f	--	--	--	--	--	--	--	--
Ffg	--	--	--	--	--	--	--	--
Fp	--	--	--	--	--	--	--	--
Fpt	--	--	--	--	--	--	--	--
GFo	--	--	--	--	--	--	--	--
GFe	--	--	--	--	--	--	--	--
GFk	--	--	--	--	--	--	--	--
Gta	--	--	--	--	--	--	--	--
Gtb-f	--	--	--	--	--	--	--	--
O	--	--	--	--	--	--	--	--
L-f	--	--	--	--	--	--	--	--
L/Gtb-f	--	--	--	--	--	--	--	--
Cs-f/Fpt	--	--	--	--	--	--	--	--
Cs-f/Bxu	--	--	--	--	--	--	--	--
Gtb-f/Bxu	--	--	--	--	--	--	--	--

Table 7. (Continued)

Terrain Unit	Total Hectares	Hectares Eliminated From Survey	Surveyable Area		Survey Coverage			
			Hectares	Percent	30 m width		60 m width	
					Hectares	Percent	Hectares	Percent
Gta/Bxu	--	--	--	--	--	--	--	--
C/Bxu + Bxu	--	--	--	--	--	--	--	--
C/Bxw + Bxw	--	--	--	--	--	--	--	--
L/Bxu	--	--	--	--	--	--	--	--
F/Fpt	--	--	--	--	--	--	--	--
Unmapped	609.89	232.05	377.84	61.95	48.24	12.77	96.48	25.53
Totals:	609.89	232.05 (38.05%)	377.84 (61.95%)		48.24 12.77% 7.91%		96.48 25.53% of Surveyable 15.82% of Total	

Table 8. Transect Coverage by Terrain Unit in Borrow F

Terrain Unit	Total Hectares	Hectares Eliminated From Survey	Surveyable Area		Survey Coverage			
			Hectares	Percent	30 m width		60 m width	
					Hectares	Percent	Hectares	Percent
Bxu	--	--	--	--	--	--	--	--
C	--	--	--	--	--	--	--	--
Cl	--	--	--	--	--	--	--	--
Cs-f	--	--	--	--	--	--	--	--
Ffg	7.04	--	7.04	100.00	.92	13.07	1.83	25.99
Fp	31.43	--	31.43	100.00	4.11	13.08	8.22	26.15
Fpt	52.05	--	52.05	100.00	7.78	14.95	15.54	29.86
GFo	--	--	--	--	--	--	--	--
GFe	--	--	--	--	--	--	--	--
GFk	--	--	--	--	--	--	--	--
Gta	137.51	-0-	137.51	100.00	18.29	13.30	36.57	26.59
Gtb-f	32.92	-0-	32.92	100.00	3.67	11.15	7.32	22.24
O	--	--	--	--	--	--	--	--
L-f	--	--	--	--	--	--	--	--
L/Gtb-f	--	--	--	--	--	--	--	--
Cs-f/Fpt	--	--	--	--	--	--	--	--
Cs-f/Bxu	--	--	--	--	--	--	--	--
Gtb-f/Bxu	--	--	--	--	--	--	--	--

Table 8. (Continued)

Terrain Unit	Total Hectares	Hectares Eliminated From Survey	Surveyable Area		Survey Coverage			
			Hectares	Percent	30 m width		60 m width	
					Hectares	Percent	Hectares	Percent
Gta/Bxu	13.32	--	13.32	100.00	1.37	10.29	2.74	20.57
C/Bxu + Bxu	--	--	--	--	--	--	--	--
C/Bxw + Bxw	--	--	--	--	--	--	--	--
L/Bxu	--	--	--	--	--	--	--	--
F/Fpt	--	--	--	--	--	--	--	--
Unmapped	179.75	--	179.75	100.00	16.24	9.03	32.47	18.06
Totals:	454.02	-0-	454.02		52.38		104.69	
			(100.00%)		11.54%		23.06% of Surveyable	
					11.54%		23.06% of Total	

Table 9. Transect Coverage by Terrain Unit in Borrow H

Terrain Unit	Total Hectares	Hectares Eliminated From Survey	Surveyable Area		Survey Coverage	
			Hectares	Percent	Hectares	Percent
Bxu	--	--	--	--	--	--
C	--	--	--	--	--	--
Cl	--	--	--	--	--	--
Cs-f	--	--	--	--	--	--
Ffg	--	--	--	--	--	--
Fp	--	--	--	--	--	--
Fpt	--	--	--	--	--	--
GFo	--	--	--	--	--	--
GFe	--	--	--	--	--	--
GFk	--	--	--	--	--	--
Gta	--	--	--	--	--	--
Gtb-f	--	--	--	--	--	--
O	10.31	10.31	--	--	--	--
L-f	--	--	--	--	--	--
L/Gtb-f	424.87	424.87	--	--	--	--
Cs-f/Fpt	--	--	--	--	--	--
Cs-f/Bxu	--	--	--	--	--	--
Gtb-f/Bxu	--	--	--	--	--	--

Table 9. (Continued)

Terrain Unit	Total Hectares	Hectares Eliminated From Survey	Surveyable Area Hectares	Surveyable Area Percent	Survey Coverage Hectares	Survey Coverage Percent
Gta/Bxu	--	--	--	--	--	--
C/Bxu + Bxu	--	--	--	--	--	--
C/Bxw + BxW	--	--	--	--	--	--
L/Bxu	--	--	--	--	--	--
F/Fpt	--	--	--	--	--	--
Totals:	435.18	435.18 (100.00%)	-0-		-0-	

Table 10. Transect Coverage by Terrain Unit in Borrow K

Terrain Unit	Total Hectares	Hectares Eliminated From Survey	Surveyable Area		Survey Coverage	
			Hectares	Percent	Hectares	Percent
Bxu	55.55	55.55	--	--	--	--
C	18.48	18.48	--	--	--	--
Cl	--	--	--	--	--	--
Cs-f	--	--	--	--	--	--
Ffg	--	--	--	--	--	--
Fp	--	--	--	--	--	--
Fpt	--	--	--	--	--	--
GFo	--	--	--	--	--	--
GFe	--	--	--	--	--	--
GFk	--	--	--	--	--	--
Gta	--	--	--	--	--	--
Gtb-f	--	--	--	--	--	--
O	--	--	--	--	--	--
L-f	--	--	--	--	--	--
L/Gtb-f	--	--	--	--	--	--
Cs-f/Fpt	--	--	--	--	--	--
Cs-f/Bxu	--	--	--	--	--	--
Gtb-f/Bxu	13.20	13.20	--	--	--	--

Table 10. (Continued)

Terrain Unit	Total Hectares	Hectares Eliminated From Survey	Surveyable Area Hectares	Surveyable Area Percent	Survey Coverage Hectares	Survey Coverage Percent
Gta/Bxu	--	--	--	--	--	--
C/Bxu + Bxu	101.83	101.83	--	--	--	--
C/Bxw + Bxw	--	--	--	--	--	--
L/Bxu	--	--	--	--	--	--
F/Fpt	--	--	--	--	--	--
Totals:	189.06	189.06 (100.00%)	-0-		-0-	

Table 11. Site Occurrence by Terrain Unit: Watana Impoundment, Watana Construction Area, Devil Impoundment, Devil Construction Area, Borrows A, C, F, H, and K

Unit	WI	WC	DI	DC	B-A	B-C	B-F	B-H	B-K	Total	Percentage
Bxu	--	--	--	--	--	--	--	--	--	--	--
C	--	--	--	--	--	--	--	--	--	--	--
Cl	--	--	--	--	--	--	--	--	--	--	--
Cs-f	--	--	--	--	--	--	--	--	--	--	--
Ffg	7	--	2	--	--	--	--	--	--	9	7.32
Fp	8	--	5	--	--	--	--	--	--	13	10.57
Fpt	7	--	--	--	--	--	--	--	--	7	5.69
GFo	1	--	--	--	--	--	--	--	--	1	.81
GFe	--	--	--	--	--	--	--	--	--	--	--
GFk	1	--	--	--	--	--	--	--	--	1	.81
Gta	1	12	--	--	--	--	1	--	--	14	11.38
Gtb-f	7	--	--	--	--	--	1	--	--	8	6.50
O	--	--	--	--	--	--	--	--	--	--	--
L-f	--	--	--	--	--	--	--	--	--	--	--
L/Gtb-f	28	--	--	--	--	--	--	--	--	28	22.76
Cs-f/Fpt	3	--	--	--	--	--	--	--	--	3	2.44
Cs-f/Bxu	--	--	--	--	--	--	--	--	--	--	--
Gtb-f/Bxu	1	--	--	--	--	--	--	--	--	1	.81
Gta/Bxu	1	6	--	--	--	--	1	--	--	8	6.50
C/Bxu + Bxu	8	--	--	--	--	--	--	--	--	8	6.50
C/Bxw + Bxw	--	--	--	--	--	--	--	--	--	--	--
L/Bxu	--	--	--	--	--	--	--	--	--	--	--
F/Fpt	--	--	--	--	--	--	--	--	--	--	--
Unmapped	--	--	--	--	--	17	5	--	--	22	17.89
Totals	73	18	7	--	--	17	8	--	--	123	99.98

Table 12. Summary of Terrain Unit Analysis: Watana Impoundment, Watana Construction Area, Devil Impoundment, Devil Construction Area, Borrow A, Borrow C, Borrow F, Borrow H, and Borrow K

Unit	Total Hectares	Areas Eliminated From Survey		Surveyable Area:		Survey Coverage: 30 m Width		60 m Width		Percent of Total Survey	Sites Located:	
		Percent	Hectares	Percent	Hectares	Percent	Hectares	Percent	Hectares	Percent		Number	Percent
Bxu	83.46[1]	.36	83.46	100.00	--	--	--	--	--	--	--	--	--
C	236.81[2]	1.02	213.38	89.18	23.13	10.82	1.38	5.97	2.74	11.85	.07	--	--
Cl	20.61	.09	9.80	47.55	10.81	52.45	2.30	21.28	4.57	42.28	.12	--	--
Cs-f	11.06	.05	--	--	11.06	100.00	1.37	12.39	2.74	24.77	.07	--	--
Ffg	876.66	3.77	383.64	43.76	493.02	56.24	119.46	24.23	238.73	48.42	6.41	9	7.32
Fp	1511.39	6.50	739.59	48.93	771.80	51.07	158.75	20.57	317.49	41.14	8.53	13	10.57
Fpt	922.40	3.96	295.90	32.08	626.50	67.92	131.74	21.03	263.37	42.04	7.07	7	5.69
GFo	192.83	.83	47.52	24.64	145.31	75.36	29.50	20.30	59.00	40.60	1.58	1	.81
GFe	.50	.02	--	--	.50	100.00	--	--	--	--	--	--	--
GFk	279.06	1.20	36.70	13.15	242.39	86.85	48.25	19.91	96.49	39.81	2.59	1	.81
Gta	1335.92	5.74	118.41	8.86	1217.51	91.14	134.00	11.01	267.94	22.01	7.20	14	11.38
Gtb-f	6058.91	26.04	2663.06	43.95	3395.85	56.05	328.25	9.67	656.25	19.33	17.62	8	6.50
O	579.12	2.49	299.21	51.67	279.91	48.33	18.79	6.71	37.47	13.39	1.01	--	--
L-f	347.69	1.49	156.62	45.05	191.07	54.95	23.79	12.45	47.54	24.88	1.28	--	--
L/Gtb-f	3237.36	13.91	830.01	25.64	2407.35	74.36	382.12	15.87	764.10	31.74	20.52	28	22.76
Cs-f/Fpt	842.95	3.62	275.56	32.69	567.39	67.31	104.99	18.50	209.90	36.99	5.64	3	2.44
Cs-f/Bxu	64.11	.28	1.76	2.75	62.35	97.25	6.64	10.65	13.28	21.30	.36	--	--

Table 12. (Continued)

Unit	Total Hectares	Areas Eliminated From Survey: Percent	Hectares	Percent	Surveyable Area: Hectares	Percent	Survey Coverage: 30 m Width Hectares	Percent	60 m Width Hectares	Percent	Percent of Total Survey	Sites Located: Number	Percent
Gtb-f/Bxu	1288.80[3]	5.54	320.37	24.86	958.43	75.14	74.59	7.70	149.15	15.40	4.01	1	.81
Gta/Bxu	445.23	1.91	64.10	14.40	381.13	85.60	50.77	13.32	101.53	26.64	2.73	8	6.50
C/Bxu + Bxu	3760.42[4]	16.16	2727.50	72.53	1032.92	27.47	173.67	16.81	347.11	33.60	9.32	8	6.50
C/Bxw + Bxw	362.03	1.56	238.83	65.97	123.20	34.03	7.56	6.14	15.10	12.26	.41	--	--
L/Bxu	1.76	.01	1.76	100.00	--	--	--	--	--	--	--	--	--
F/Fpt	17.10	.07	17.10	100.00	--	--	--	--	--	--	--	--	--
Unmapped	789.64	3.39	232.05	29.39	557.59	70.61	64.48	11.56	128.95	23.13	3.46	22	17.89
Totals:													
	23,265.82	99.99%	9,756.63	(41.94%)	13,509.19	(58.06%)	1,862.40	13.79%	3,723.45	27.56% of Surveyable	100.00	123	99.98%
								8.00%		16.00 of Total			

* Percent of total survey values are based on 60 m transect width

Note: A boundary overlap of the Devil Construction Area with Borrow K required that the following terrain unit areas be subtracted from the total hectare amount in order for that total to be true: 1) 44.24 hectares; 2) 14.21 hectares; 3) 13.20 hectares; 4) 46.52 hectares.

Table 13. Sites in Relation To Terrain Units

Bxu	Ffg	Fp	Fpt	GFo	GFe	GFk	Gta	Gtb-f	L/Gtb-f	Cs-f/ Gtb-f	Cs-f/ Fpt	Gtb-f/ Bxu	Gta/ Bxu	C/Bxu + Bxu	Unmapped
TLM	TLM	TLM	TLM	TLM	TLM	TLM	TLM	TLM	TLM	TLM	TLM	TLM	TLM	TLM	TLM
031	023	034	026	043	022	075	015	049	039	106	173	030	017	026	021
032	024	035	033		028		016	050	041	107	204	069	018	027	025
037	077	079	042		185		051	060	048		233	101	112	029	036
	232	178	052				074	061	059			103	116	040	038
	238	196	053				098	065	063			104	137	047	044
	239	206	062				099	073	064			114	165	058	045
	241	229	080				108	119	122			118	166	072	046
	242	230	182				109	120	123			144	167	102	054
	249	240	199				110	121	124				169	115	055
	258	250	200				111	125	126				214	145	056
		251	256				113	127	128					246	057
		252	257				117	132	129					247	066
		253					138	139	130					248	067
		259					146	140	131						068
							147	171	133						070
							149	194	134						071
							150	207	135						078
							151	212	141						081
							152	218	142						082
							153		143						083

Table 13. (Continued)

Bxu	Ffg	Fp	Fpt	GFo	GFe	GFk	Gta	Gtb-f	L/Gtb-f	Cs-f/ Gtb-f	Cs-f/ Fpt	Gtb-f/ Bxu	Gta/ Bxu	C/Bxu + Bxu	Unmapped
							TLM		TLM						TLM
							154		148						084
							155		159						085
							160		174						086
							164		175						087
							168		183						088
							170		184						089
							172		195						090
							177		198						091
							180		215						092
							181		216						093
							188		217						094
							191		220						095
							192		221						096
							193		222						097
							197		223						100
							208		224						105
							245		225						136
									226						176
									227						179
									228						180

Table 13. (Continued)

Bxu	Ffg	Fp	Fpt	GFo	GFe	GFk	Gta	Gtb-f	L/Gtb-f	Cs-f/ Gtb-f	Cs-f/ Fpt	Gtb-f/ Bxu	Gta/ Bxu	C/Bxu + Bxu	Unmapped
									TLM						TLM
									231						187
									234						189
									235						190
									236						201
									237						202
									243						203
									244						205
															209
															210
															211
															213
															HEA
															174
															175
															176
															177
															178
															179
															180

Table 13. (Continued)

Bxu	Ffg	Fp	Fpt	GFo	GFe	GFk	Gta	Gtb-f	L/Gtb-f	Cs-f/ Gtb-f	Cs-f/ Fpt	Gtb-f Bxu	Gta Bxu	C/Bxu + Bxu	Unmapped
															HEA
															181
															182
															183
															184
															185
															186
															210
															211
															FAI
															213
															214
Total															
3	10	14	12	1	3	1	38	19	47	2	3	8	10	13	69
%															
(1.2)	(4.0)	(5.5)	(4.7)	(.4)	(1.2)	(.4)	(15.0)	(7.5)	(18.6)	(.8)	(1.2)	(3.2)	(4.0)	(5.1)	(27.3)

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