VI. METHODOLOGY

A. Field Procedures

While field methods varied somewhat between Phase I and II investigations, certain observations can be made in terms of general techniques. Ground surface visibility was restricted in all three areas, rendering the survey and testing for artifact distributions through surface reconnaissance impractical. Thus, subsurface sampling was required to accurately assess the presence and nature of archaeological resources on the properties. Sampling in archaeological survey and testing involves examining artifact distributions based on a specified portion, or sample, of the study area and inferring statistically from that sample as to the nature of distributions across the whole area (Mueller 1974). The most appropriate technique in the present case consisted of a systematic sample—an evenly spaced array of shovel tests used to examine with equal intensity all sections of the properties. As a probabilistic technique, systematic sampling presents some difficulties, particularly in terms of error estimation, due to the lack of independence of the sample elements (Shennan 1988). Yet in the present investigation, rigorous calculation of confidence intervals was of less importance than a general assessment of artifact distributions across the study areas, and thus the procedure was chosen as the most efficient field technique.

Shovel test grids were established over each study area, the size of grid intervals and orientation of baselines varying with individual site conditions. These site-specific data are presented with the findings for each area. Shovel tests measured an average 50 centimeters in diameter and were excavated by observed stratigraphy. Depths were measured relative to ground surface. All excavated soils were passed through quarter-inch mesh hardware cloth to enhance data recovery. Profiles of each test were recorded on standard forms, listing soil consistency, color (using Munsell Soil Color Chart notation), and inclusions. Each test was drawn to scale as a column profile. Shovel tests within the grid were labeled by Cartesian co-ordinates based on site datum points established beyond testing limits.

Phase II testing at Iron Hill East involved excavating close-interval shovel tests around selected shovel tests in the original grid, which contained prehistoric artifacts. These close-interval shovel tests were identical to tests on the initial grid in size and excavation techniques.

In addition, formal test excavation units measuring $1m^2$ were employed in Phase II investigations at Iron Hill East in areas exhibiting artifact concentration. The purpose of the test units was to allow more detailed examination of stratigraphic associations, and to test for the presence of intact archaeological features, thereby aiding in the overall assessment of site significance. Test units were designated numerically in order of excavation, along with the co-ordinate address of the northeast corner of the unit. By site convention, vertical datum points were established in the northeast corner of each unit. Vertical measurements for each unit were taken from the datum using string and line level.

Test units were excavated in 10cm arbitrary levels within natural stratigraphic breaks. Data were recorded on standardized field forms for each unit: the information included soil descriptions (texture, moisture content, and color, the latter using Munsell Soil Color Chart notation); a preliminary field listing of artifactual materials recovered; observations on non-artifactual inclusions; and field interpretations as to depositional history. Representative profile sections were drawn to scale and photographed. All excavated soils were screened through quarter-inch mesh hardware cloth to maximize artifact recovery. Artifacts from each test unit and level were bagged in polyethylene bags according to provenience. Fire-cracked rock was counted and weighed in the field and subsequently discarded, unless particular characteristics suggested the need for further analysis in the lab. Provenience information for each artifact bag was recorded in the field on a master Bag Inventory sheet.

B. Laboratory Procedures

1. Artifact Handling and Cataloguing

At the conclusion of fieldwork, artifacts were returned to the Parsons Engineering Science Laboratory for processing. All artifacts were cleaned, bagged, catalogued, and packed for temporary storage until final disposition. Cataloguing was conducted according to a series of material type, morphological design, and diagnostic attributes, and a comprehensive inventory was compiled using dBase III+ database management software. Statistical and other data manipulation was conducted using a variety of commercially available software packages.

In addition to provenience information, coding for computer database entry includes the data listed in Table 6-1. A detailed list of database codes may be found with the complete Artifact Inventory in Appendix D.

Artifacts were labeled according to the standards of the October 1993 Delaware State Museums Interim Sampling and Curation Policy (Delaware Historic Preservation Office 1993). All materials were placed in numbered polyethylene bags, which were sorted by material type to lessen the potential for damage during storage. Bags were placed in archival boxes by catalog number order, with the appropriate provenience information. Artifacts, field documentation, and photographs will be submitted to the Island Field Museum for curation.

2. Size-Grading and Mass Analysis if Lithic Debris

Flake aggregate analysis, or mass analysis, was adapted for use with the Iron Hill East database from a methodology elaborated by Ahler (1986, 1989). Mass analysis consists of grading debitage according to established size intervals, or size-grades, and the retrieval of various quantitative data from each grade. Grading is typically accomplished using a series of nested screens with mesh openings of standard sizes. Due to the relatively small sample sizes from the site proveniences at Iron Hill East, grading was done using circular templates that mimic the nested screens normally used. The diameters of each template corresponded with the hypotenuse of the appropriate screen mesh. The size-grades and corresponding mesh opening dimensions used in the current study are equivalent to those employed by Ahler (1986:46), with the addition of two grades—0 and 1.5. Correspondences are listed in Table 6-2.

Table 6-1: Data Categories Recorded in Artifact Database

- *group and class*--broad hierarchical subdivisions for historic period artifacts based on South's (1977) typology for artifact pattern analysis
- *raw material*--using general mineralogical terms for lithics types
- *morphological type*--for prehistoric artifacts, technologically derived terms are generally employed, though some widely accepted functional terms are used
- *typology*--for prehistoric artifacts, generally accepted morphological types associated with known chronological periods; for historic period artifacts, a hierachical subdivision usually based on manufacturing technology
- *function*--specific functional classification for certain historic period artifacts
- *subtechs*--various technological and decorative attributes of historic period artifacts
- *segment*--indicating completeness or, if incomplete, the section of the artifact represented
- *amount of cortex*--reported for certain classes of lithic debitage, and expressed as a percentage of the dorsal surface
- *color*--listed separately on the basis of body, glaze, and decoration for historic period artifacts
- *size grade*-- measured on debitage as an indication of geometric dimension
- *weight*--expressed in grams, reported as an additional indication of artifact size

3. Spatial Analysis

A commercially available software package (SURFER) which generates surface contour plans from grid-based data, was used to analyze the horizontal distribution of artifacts at Iron Hill East. The software was originally designed to produce topographic maps diagramming the physiographic features of a landscape. It has subsequently been

Table 6-2. Comparison of Size-Grade Intervals

Size-grade	Screen Mesh Opening	Hypotenuse/ Template Diameter
0	5.1cm	7.2cm
1	2.5cm	3.6cm
1.5	n/a	2.7cm
2	1.3cm	1.8cm
3	0.6cm	0.8cm
4	0.3cm	0.4cm

adopted by other disciplines, including archaeology, where it is typically used to perform a type of cluster analysis resulting in plans of horizontal artifact frequency distributions. The isopleths, or lines connecting areas of equal magnitude (in this case artifact frequency), are determined by one of a series of interpolation algorithms that estimate the distribution of material within a given collection unit by examining the arrangement of the surrounding data.

The program interpolates values between existing points using a method referred to as kriging, a form of spatial autocorrelation originally designed for forecasting and mapping mineral deposits (Hodder and Orton 1976). Kriging uses regionalized variables that change according to location, though not in a manner that can be described by a fixed mathematical function. Rather, interpolation is accomplished using moving averages and the estimation of error associated with variable distributions (Zubrow and Harbaugh 1978).