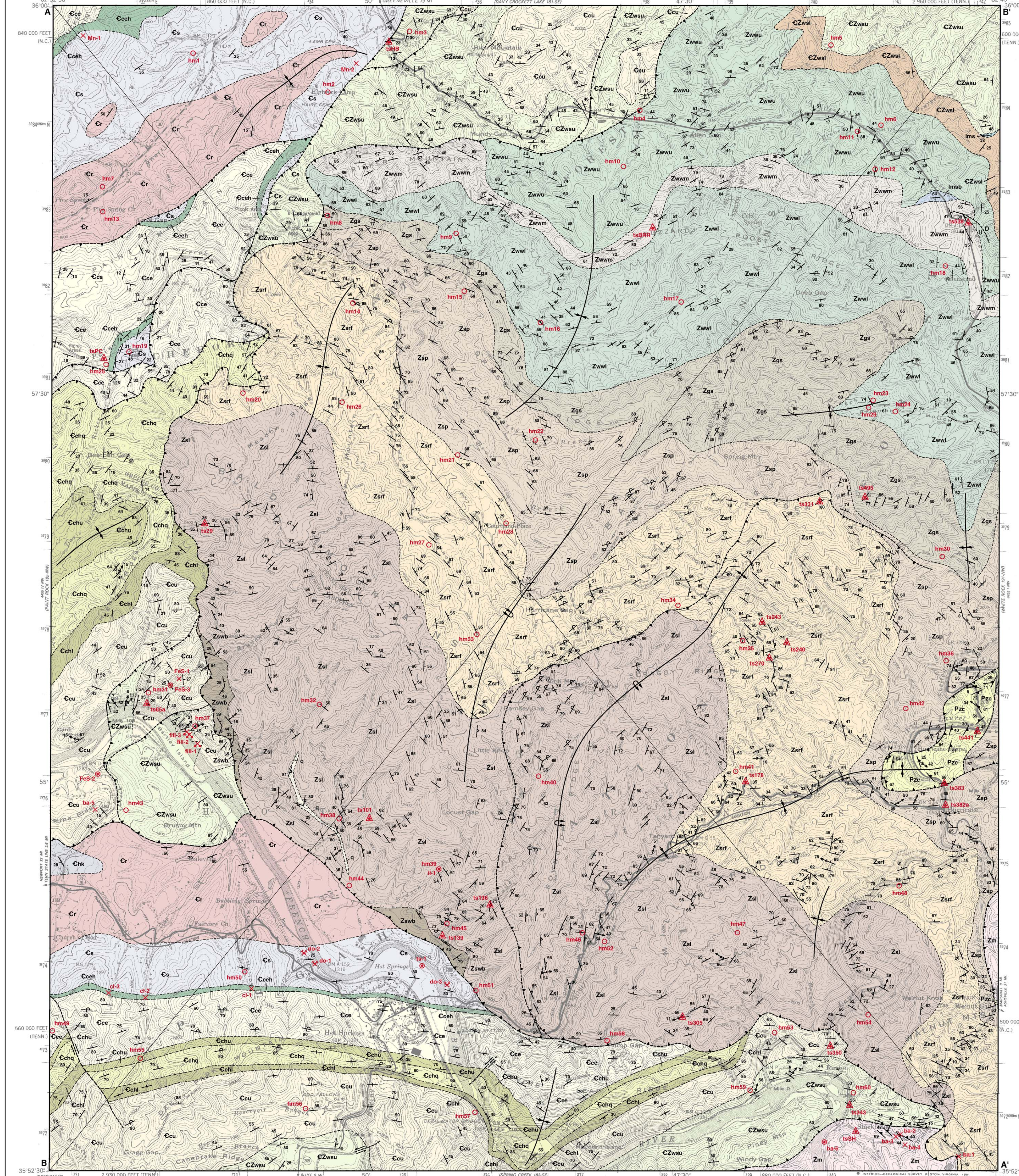


BEDROCK GEOLOGIC MAP OF THE HOT SPRINGS 7.5-MINUTE QUADRANGLE, NORTH CAROLINA AND TENNESSEE



NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
 DIVISION OF LAND RESOURCES
 This geologic map was funded in part by the USGS National Cooperative Geologic Mapping Program

NORTH CAROLINA GEOLOGICAL SURVEY
 OPEN FILE REPORT 1996-05 REVISED 2002



MAP UNITS

ROCKS OF UNCERTAIN AGE

- Quartz

CATACLASTIC ROCKS

- Cataclastite

METASEDIMENTARY SEQUENCE

- Honaker Dolomite
- Rome Formation
- Shady Dolomite

CHILHOWEE GROUP

- Helenmode Member
- Quartzite Unit
- Upper Shale Member
- Middle Quartzite Member
- Lower Shale Member
- Unicoi Formation

SANDSUCK FORMATION

- Upper unit
- Lower unit

WILHITE FORMATION

- Upper unit
- Middle unit - metamelt breccia
- Lower unit

WALDEN CREEK GROUP

- Conglomerate
- Pigeon Siltstone
- Roaring Fork Sandstone
- Longarm Quartzite
- Wading Branch Formation

META-INTRUSIVE ROCKS

- Max Patch Granite

STRUCTURAL FEATURES

CONTACTS

- Thrust Fault (with or without reversion)
- High-Angle Reverse Fault (5/10° Dip)
- Stratigraphic Contact

STRIKE AND DIP OF PLANAR FEATURES

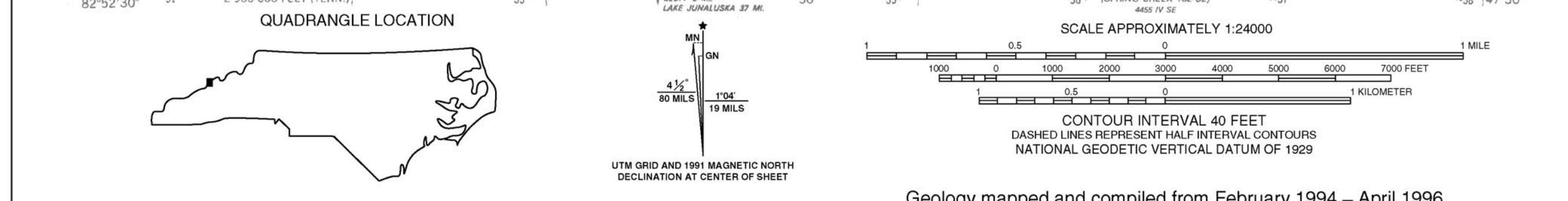
- Bedding
- Staty Cleavage
- Foliation in Basement Rocks
- Joint
- Overturned Bedding
- Vertical Bedding
- Foliation in Metasediments
- Vertical Foliation(s) in Basement Rocks

BEARING AND PLUNGE OF LINEAR FEATURES

- Lineation
- Intersection

MINERAL RESOURCES

Occurrence, Prospect, Abandoned mine or quarry, This section sample site, Mineral resource number, referred to in accompanying Mineral Resource Summary, Commodity letter symbols: Barite, Limestone, Dolomite, Manganese, Clay, Iron Sulfides, Fill material, Thermal Springs



BY
MARK W. CARTER
 With Additional Data Compiled From
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Geology mapped and compiled from February 1994 – April 1996 and August 1996 – October 2001
 Map preparation, editing, and digital cartography by Mark W. Carter.

¹Bearce, D. N., 1966, Geology of the Chilhowee Group and Coe Series in the southwestern Bald Mountains in the Hot Springs window, the unit is dominantly limestone, which is light gray to dark gray to locally dark blue when fresh, weathers grayish yellow to moderate yellowish brown; fine-grained, finely laminated to thin-bedded, massive, argillaceous. Chert, which is light gray to black, subconformable to wavy, and concentrically bedded, is locally common.

SKETCH MAP SHOWING ELEMENTS OF METAMORPHIC CONDITIONS
 Metamorphic and primary igneous mafic minerals observed in stream sediment heavy mineral samples and thin sections shown.
 Metamorphic Zones: Area of chlorite grade metamorphism, Area of biotite grade metamorphism, Area of garnet grade metamorphism, Area of amphibolite facies metamorphism.
 Gamma radiation readings recorded at ground level using a Mount Scotts BC-132 Scintillation Counter with a 1.5" x 1.5" sodium iodide crystal from April 1997 – June 1997. Gamma radiation results from the distribution of thorium, uranium, and potassium in the sediment are presented in this section. Values are not corrected for background cosmic radiation or radon gas emissions. Contouring by interpolation using RockWare®.

SKETCH MAP SHOWING CONTOURED SCINTILLATION READINGS
 Gamma radiation readings recorded at ground level using a Mount Scotts BC-132 Scintillation Counter with a 1.5" x 1.5" sodium iodide crystal from April 1997 – June 1997. Gamma radiation results from the distribution of thorium, uranium, and potassium in the sediment are presented in this section. Values are not corrected for background cosmic radiation or radon gas emissions. Contouring by interpolation using RockWare®.

STREAM SEDIMENT HEAVY MINERAL ANALYSIS

Stream sediment heavy mineral analysis was conducted April 1997 – June 1997 to aid geologic mapping, better define conditions of metamorphism, and inventory networks of potential economic significance. Procedure in the field, approximately 12.8 kg of stream sediment material is panned to approximately 200 g of heavy mineral concentrate at each sample locality (scintillation data are also collected at the sample sites). In the laboratory, concentrate is washed and passed through heavy liquid separation using methylene iodide and bromine methanesulfonic acid, and scanned with short- and long-wavelength ultraviolet illumination using an Ultra-Violet Products Inc. Model UVGL-44 Mineralogical Lamp. Magnetite is removed with an alnico hand magnet. A sample of the concentrate is mounted on a standard 27x46 mm glass slide and approximately 200 grains are identified and counted with the aid of a petrographic microscope and 1.67 index of refraction oil. Results of stream sediment heavy mineral analysis are tabulated below.

SAMPLE#	COORDINATES	MAP UNITS	%HM IN SAMPLE	PERCENT HEAVY MINERALS IN SAMPLE ¹															
				Mag	Hem	Lz	Zr	Tsp	Hb	Ky	Ep	Grt	Hbl	St					
hsm001	1882 2302 2317 2318	Cz-Cu	0.14	14.87	20.58	13.33	2.77	3.77	1.37	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
hsm002	1882 2302 2317 2318	Cz-Cu	0.14	14.87	20.58	13.33	2.77	3.77	1.37	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
hsm003	1882 2302 2317 2318	Cz-Cu	0.14	14.87	20.58	13.33	2.77	3.77	1.37	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
hsm004	1882 2302 2317 2318	Cz-Cu	0.14	14.87	20.58	13.33	2.77	3.77	1.37	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
hsm005	1882 2302 2317 2318	Cz-Cu	0.14	14.87	20.58	13.33	2.77	3.77	1.37	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
hsm006	1882 2302 2317 2318	Cz-Cu	0.14	14.87	20.58	13.33	2.77	3.77	1.37	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
hsm007	1882 2302 2317 2318	Cz-Cu	0.14	14.87	20.58	13.33	2.77	3.77	1.37	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
hsm008	1882 2302 2317 2318	Cz-Cu	0.14	14.87	20.58	13.33	2.77	3.77	1.37	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
hsm009	1882 2302 2317 2318	Cz-Cu	0.14	14.87	20.58	13.33	2.77	3.77	1.37	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
hsm010	1882 2302 2317 2318	Cz-Cu	0.14	14.87	20.58	13.33	2.77	3.77	1.37	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
hsm011	1882 2302 2317 2318	Cz-Cu	0.14	14.87	20.58	13.33	2.77	3.77	1.37	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
hsm012	1882 2302 2317 2318	Cz-Cu	0.14	14.87	20.58	13.33	2.77	3.77	1.37	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
hsm013	1882 2302 2317 2318	Cz-Cu	0.14	14.87	20.58	13.33	2.77	3.77	1.37	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
hsm014	1882 2302 2317 2318	Cz-Cu	0.14	14.87	20.58	13.33	2.77	3.77	1.37	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
hsm015	1882 2302 2317 2318	Cz-Cu	0.14	14.87	20.58	13.33	2.77	3.77	1.37	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
hsm016	1882 2302 2317 2318	Cz-Cu	0.14	14.87	20.58	13.33	2.77	3.77	1.37	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
hsm017	1882 2302 2317 2318	Cz-Cu	0.14	14.87	20.58	13.33	2.77	3.77	1.37	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
hsm018	1882 2302 2317 2318	Cz-Cu	0.14	14.87	20.58	13.33	2.77	3.77	1.37	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
hsm019	1882 2302 2317 2318	Cz-Cu	0.14	14.87	20.58	13.33	2.77	3.77	1.37	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
hsm020	1882 2302 2317 2318	Cz-Cu	0.14	14.87	20.58	13.33	2.77	3.77	1.37	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
hsm021	1882 2302 2317 2318	Cz-Cu	0.14	14.87	20.58	13.33	2.77	3.77	1.37	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
hsm022	1882 2302 2317 2318	Cz-Cu	0.14	14.87	20.58	13.33	2.77	3.77	1.37	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
hsm023	1882 2302 2317 2318	Cz-Cu	0.14	14.87	20.58	13.33	2.77	3.77	1.37	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
hsm024	1882 2302 2317 2318	Cz-Cu	0.14	14.87	20.58	13.33	2.77	3.77	1.37	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
hsm025	1882 2302 2317 2318	Cz-Cu	0.14	14.87	20.58	13.33	2.77	3.77	1.37	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
hsm026	1882 2302 2317 2318	Cz-Cu	0.14	14.87	20.58	13.33	2.77	3.77	1.37	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
hsm027	1882 2302 2317 2318	Cz-Cu	0.14	14.87	20.58	13.33	2.77	3.77	1.37	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
hsm028	1882 2302 2317 2318	Cz-Cu	0.14	14.87	20.58	13.33	2.77	3.77	1.37	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
hsm029	1882 2302 2317 2318	Cz-Cu	0.14	14.87	20.58	13.33	2.77	3.77	1.37	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
hsm030	1882 2302 2317 2318	Cz-Cu	0.14	14.87	20.58	13.33	2.77	3.77	1.37	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
hsm031	1882 2302 2317 2318	Cz-Cu	0.14	14.87	20.58	13.33	2.77	3.77	1.37	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
hsm032	1882 2302 2317 2318	Cz-Cu	0.14	14.87	20.58	13.33	2.77	3.77	1.37	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
hsm033	1882 2302 2317 2318	Cz-Cu	0.14	14.87	20.58	13.33	2.77	3.77	1.37	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
hsm034	1882 2302 2317 2318	Cz-Cu	0.14	14.87	20.58	13.33	2.77	3.77	1.37	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
hsm035	1882 2302 2317 2318	Cz-Cu	0.14	14.87	20.58	13.33	2.77	3.77	1.37	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
hsm036	1882 2302 2317 2318	Cz-Cu	0.14	14.87	20.58	13.33	2.77	3.77	1.37	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
hsm037	1882 2302 2317 2318	Cz-Cu	0.14	14.87	20.58	13.33	2.77	3.77	1.37	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
hsm038	1882 2302 2317 2318	Cz-Cu	0.14	14.87	20.58	13.33	2.77	3.77	1.37	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
hsm039	1882 2302 2317 2318	Cz-Cu	0.14	14.87	20.58	13.33	2.77	3.77	1.37	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
hsm040	1882 2302 2317 2318	Cz-Cu	0.14	14.87	20.58	13.33	2.77	3.77	1.37	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
hsm041	1882 2302 2317 2318	Cz-Cu	0.14	14.87	20.58	13.33	2.77	3.77	1.37	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
hsm042	1882 2302 2317 2318	Cz-Cu	0.14	14.87	20.58	13.33	2.77	3.77	1.37	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
hsm043	1882 2302 2317 2318	Cz-Cu	0.14	14.87	20.58	13.33	2.77	3.77	1.37	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
hsm044	1882 2302 2317 2318	Cz-Cu	0.14	14.87	20.58	13.33	2.77	3.77	1.37	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
hsm045	1882 2302 2317 2318	Cz-Cu	0.14	14.87	20.58	13.33	2.77	3.77	1.37	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
hsm046	1882 2302 2317 2318	Cz-Cu	0.14	14.87	20.58	13.33	2.77	3.77	1.37	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
hsm047	1882 2302 2317 2318	Cz-Cu	0.14	14.87	20.58	13.33	2.77	3.77	1.37	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
hsm048	1882 2302 2317 2318	Cz-Cu	0.14	14.87	20.58	13.33	2.77	3.77	1.37	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
hsm049	1882 2302 2317 2318	Cz-Cu	0.14	14.87	20.58	13.33	2.77	3.77	1.37	1.37	0.00	0.00	0.00						