

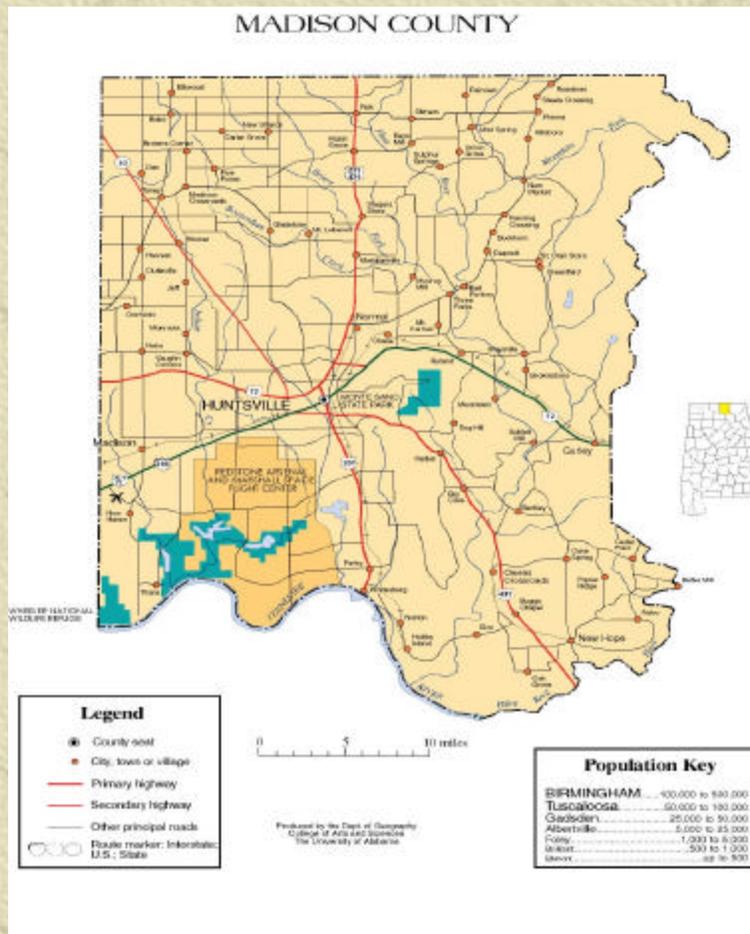
Soil Survey Update of Redstone Arsenal, Alabama



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MLRA Soil Survey Project Leader
USDA-NRCS

Introduction



- ✦ Madison County, Alabama
- ✦ Redstone Arsenal, Alabama
- ✦ Bounded by the city of Huntsville and the Tennessee River encompassing Wheeler National Wildlife Refuge
- ✦ Federally owned and is mainly used by the United States Army.
- ✦ 37,910 acres of land and small water areas and is about 11 miles from north to south and about 8 miles from east to west.

Introduction



- ✧ MLRA 128, Southern Appalachian Valley and Ridges
- ✧ The landscape is characterized by a few remnant hills of the Cumberland Plateau surrounded at lower elevations by dissected uplands of larger extent and floodplains of the Tennessee River and other large creeks.
- ✧ Elevations range from about 550 feet to 1235 feet.
- ✧ Rock strata are the Bangor Limestone, Hartselle Sandstone, Monteagle Limestone, and Tusculumbia Limestone

History



- ✦ Redstone Arsenal came into existence in 1942 during World War II to supplement the manufacturing and the production of the Chemical War Service's only chemical manufacturing plant at Edgewood Arsenal, Maryland.
- ✦ First called Redstone Ordnance Plant, the name changed to Redstone Arsenal in 1943. The term "Redstone" was adopted because of the red rocks and soil of northern Alabama (ref). In 1949, the neighboring Huntsville Arsenal was combined with Redstone Arsenal.

History



Chemical Weapon Production 1941 - 1945

- ✦ Mustard Gas
- ✦ Lewisite
- ✦ Phosgene
- ✦ White Phosphorus
- ✦ Carbonyl Iron
- ✦ White Smoke Munitions
- ✦ Tear Gas
- ✦ Incendiaries
- ✦ Colored Smoke
- ✦ Grenade fuses
- ✦ liquid bomb propellants



History



✦ Missile testing

- ✦ Began April 15, 1950 with the arrival of Dr. Wernher von Braun and his team of German scientists and engineers.

CHAPARRAL

CORPORAL

DART

DRAGON

ENTAC

HAWK

HELLFIRE

HONEST JOHN

JAVELIN

JUPITER

LACROSSE

LANCE

LITTLEJOHN

MLRS

PATRIOT

PERSHING

REDEYE

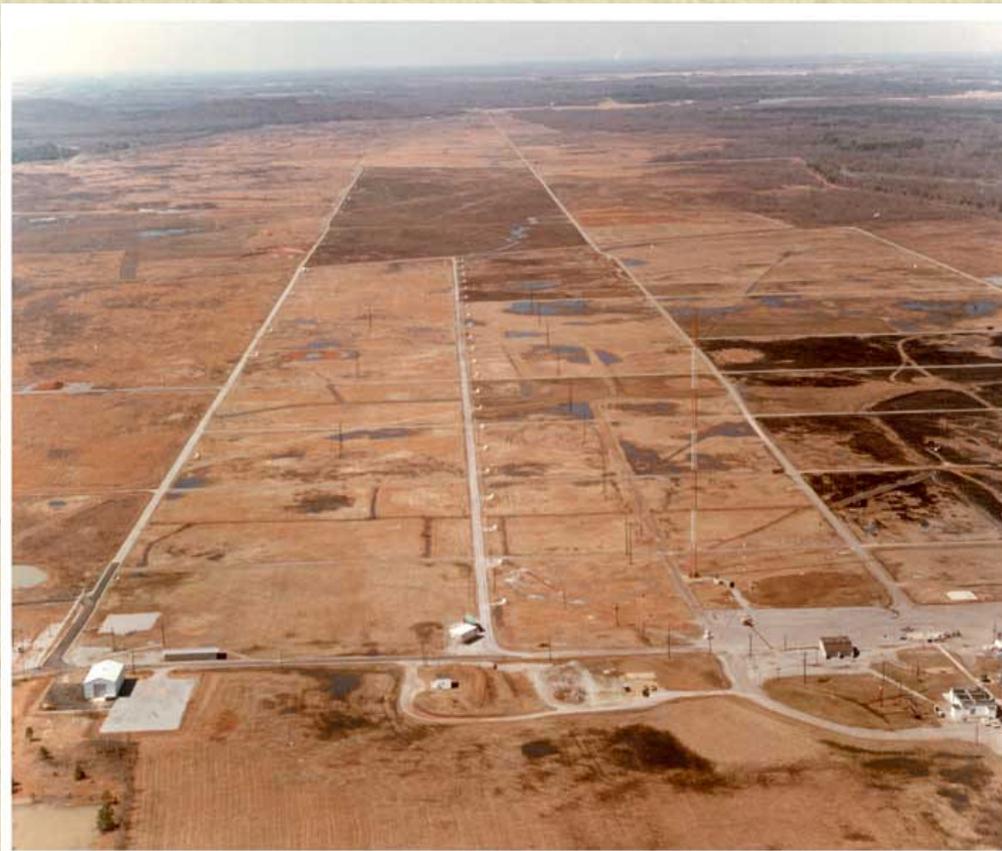
REDSTONE

SERGEANT

STINGER / AVENGER

TOW

Missile Test Ranges



The Task



- ✦ Order 2, 1:24,000 digitized, updated soil map
- ✦ Interpretive Tables
- ✦ Supporting manuscript
- ✦ Color photos
- ✦ Laboratory data
- ✦ Friendly format

The Budget

COST ESTIMATE FOR THE SOIL SURVEY OF REDSTONE ARSENAL, ALABAMA MAY 14, 2000		COST
PERSONNEL		
Project Leader (290 days @ 341.62 / day)		99,069.80
Project Member (160 days @ 277.72 / day)		44,435.20
SDQS (Correlation) (30 days @ 408.27 / day)		12,248.10
Editor (20 days @ 408.27 / day)		8,165.40
Engineer (5 days @ 408.27 / day)		2,041.35
Biologist (5 days @ 408.27 / day)		2,041.35
Forester (5 days @ 408.27 / day)		2,041.35
Agronomist (5 days @ 408.27 / day)		2,041.35
SUBTOTAL		172,1083.90
MATERIALS		
Digital Raster Graphics (DRGs) & Topographic maps and copies of aerial photography		800.00
Photography (B&W 1:24,000 w/ Stereo Coverage)		900.00
SUBTOTAL		1,700.00
EQUIPMENT & OVERHEAD		
Office and Supplies (phone, vehicles)		10,000.00
SUBTOTAL		10,000.00
INVESTIGATIONS		
Laboratory		
Auburn University (5 samples @ 1,000 / sample)		5,000.00
Backhoe rental		1,000.00
Engineering (Ala. Hwy. Dept. – no cost)		0.00
SUBTOTAL		6,000.00
MANUSCRIPT		
Printing & Binding (30 copies)		600.00
SUBTOTAL		600.00
DIGITIZING & SOIL BUSINESS		
Compilation, Finishing, and Digitizing (37,910 acres X \$0.30)		11,373.00
SUBTOTAL		11,373.00
PER DIEM EXPENSES		
(520 days @ 96.00 / day)		49,920.00
SUBTOTAL		49,920.00
GRAND TOTAL		251,703.90
COST / ACRE		6.64



The Process

-
- ✧ Field work began February 2001
 - ✧ Transects
 - ✧ Lab data on 8 pedons from Auburn and AAMU
 - ✧ Field work complete January 2002
 - ✧ Recompiled from 1958 maps to Y2K halftone
 - ✧ Digitization complete May 2002
 - ✧ TUDS from OSD's
 - ✧ MUDS generated from NASIS
 - ✧ NASIS generated interps (new interps for trafficability, bivouac areas, helicopter landing zones, excavations for fighting positions)
 - ✧ Color pedon and landscape digital photos
 - ✧ Tech and English edits, June 2002

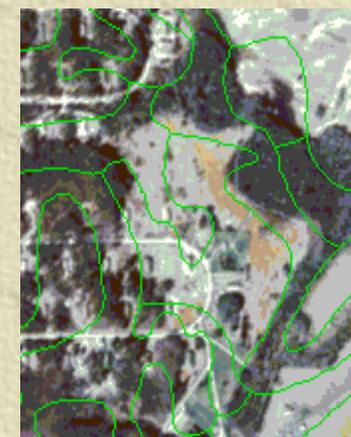
Soil Survey of Madison County, Alabama



- Colored paper map base at 1:21,120 scale.



- Later recompiled and printed on 1979 B/W photos



Digitized

* Field work completed in 1947, published in 1958 *

Updated Map



- ✦ Recompiled from original 1958 map sheets
- ✦ Y2K DOQ
- ✦ Disturbed soils delineated

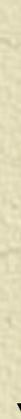
The Product

-
- ✦ CD final product w/ 30 in-house hard copies
 - ✦ Product to AMCOM by July 2002
 - ✦ 1 ½ years start to finish

Soil Pedons



1958 Correlation....Decatur



2002 Correlation....Decatur

Fine, kaolinitic, thermic
Rhodic Paleudults

Soil Pedons



1958 Correlation

.....Abernathy silt loam



2002 Correlation

..... Emory silt loam

Fine-silty, siliceous, active,
thermic Oxyaquic
Paleudult

Soil Pedons



1958 Correlation

.....Rockland, limestone



2002 Correlation

.....Rock outcrop-Gladdice

Very-fine, mixed, active,
thermic Vertic Hapludalfs

Soil Pedons



1958 Correlation

.....Robertsville

2002 Correlation... Ketona

Fine, mixed, superactive,
thermic Vertic Epiaqualfs

Slickensides
(Btss Horizon)



Soil Pedons



1958 Correlation

.....Capshaw, Captina, or
Monongahela soils



2002 Correlation.....Locust

Fine-loamy, mixed,
semiactive, thermic
Glossic Fragiudults

Soil Pedons



1958 Correlation

.....Abernathy fine sandy
loam



2002 Correlation

.....Swafford Overwash
Fine-loamy, siliceous,
semiactive, thermic
Fragiaquic Paleudults

Soil Pedons



1958 Correlation

.....Allen or Cumberland
soils

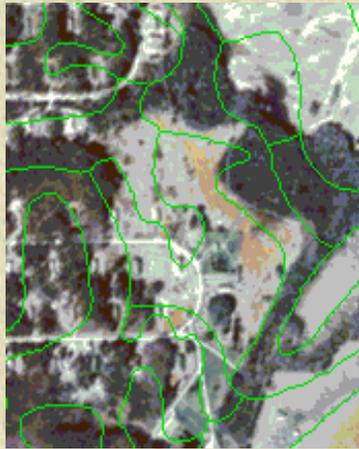


2002 Correlation

.....Waynesboro

Fine, kaolinitic, thermic
Typic Paleudults

Lessons on Updating a Survey

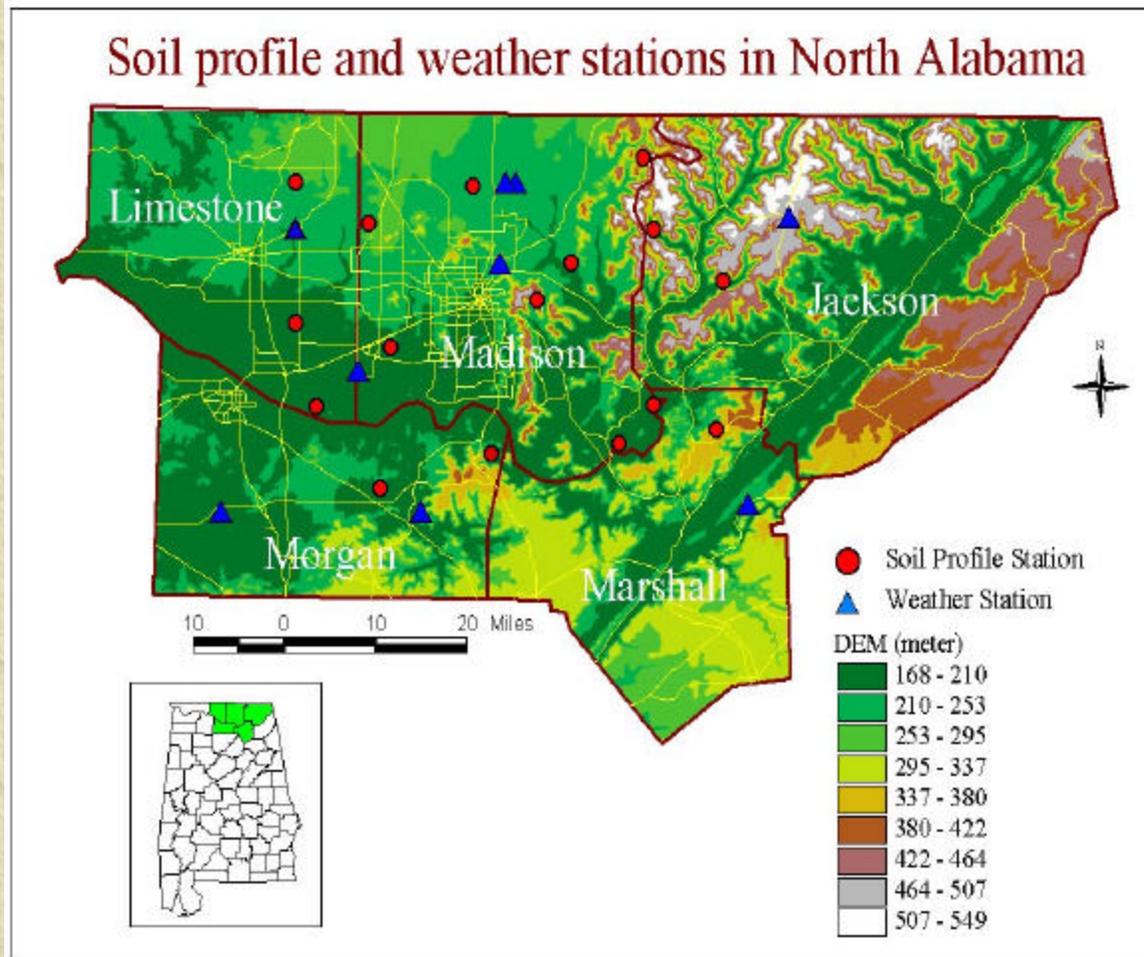


Digitize first



Backhoe pits are
a bare necessity

Validating Remote Data



- ✦ 9 Weather Stations
- ✦ 16 Soil Profile Stations
- ✦ Joint project with AAMU, NRCS-SCAN, NASA
- ✦ Dr. Teferi Tsegaye, Soil Physicist, AAMU, PI

SCAN Stations- Validating Remote Data



Hytap, Alabama

Generated Data

Weather-related, hourly readings

- precipitation
- air temp
- solar radiation
- wind speed and direction
- relative humidity
- barometric pressure

Soil-related, hourly readings

- Measured at 2, 4, 8, 20 and 40 inches
- Soil moisture
- Soil temperature
- Soil salinity
- Real dielectric constant

Benefits

-
- ✱ Interpret imagery
 - ✱ Long-term soil-weather relationships
 - ✱ Production agriculture
 - waste mgt
 - Planting, harvesting, grazing
 - pesticide applications
 - ✱ Risk assessments, ie flooding, drought, crop insurance, soil compaction
 - ✱ Soil correlation
 - temperature and moisture regimes
 - pedon description and lab data for each site
 - ✱ Populate layers in NASIS
 - ✱ Modeling
 - Crop production
 - Pests, disease, weeds
 - ✱ Other

The Near Future

- ✦ Characterization sampling for all weather/soil profile station sites
- ✦ Characterize pedons on Cumberland Plateau as part of a US Forest Service/AAMU Timber Management Study
- ✦ Proposal for map compilation and digitizing at AAMU.
- ✦ Begin another soil survey project

Acknowledgements



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