Name:_____

Lab #02
Introduction to Photo Interpretation and Stereo Images
Feb. 7, 2018
Remote Sensing 4113/5113

Please don't mark the color photos or maps. Make all the necessary marks on the clear overlays you'll place over them. Return those color photos and maps at the end of the lab.

Equipment: Stereo air photos, stereoscope, map, dip nomogram (provided with lab), and ruler, pens, acetate overlay, drafting tape.

Basic Parameters:

1. **Photo Scale:** We need to determine the scale of the photos, and for that we also need to first find the scale of the map.

To find the scale of the map, you want to find two spots on the map that are a known (real world) distance apart, measure their distance apart on the map itself, and then find the ratio of the map distance to the real world distance. To get an accurate scale you want to measure distances on the map which are reasonably long. Any measurement you make will probably have an uncertainty of a millimeter or so. If for example you measure the length of the km. scale bar to be 2 cm, that gives you a map scale of 2 cm : 1 km, or, after converting to common units, 0.02 m : 1000 m or after simplifying and canceling units, 1 : 50,000 . (Your value should be in this 1:50,000 ballpark, but not exactly that.) However measuring something as short as that scale bar is not a good idea, since your measured 2cm length could easily be off by 1mm, resulting in a 5% error. If instead you use the 1km UTM marks along the edge of the map, and measure a distance for 7 km, you still have a 1 mm error, but as a percentage of the total, that is 7 times less. So use the UTM marks along the edge or the 1km UTM squares to determine the map scale. Do avoid crossing the grid boundary which occurs about 1/3 in from the right side, as that will produce bad distances.

Map Scale = _____

We next need to find the scale of the photos, which will be similar to the map, but not exactly the same. Find two features on the image which are well separated (for the above reasons) and can be identified unambiguously on the image and on the map, and are unlikely to have moved. (Road intersections are usually a good choice.) Measure their separation in cm on the map, and use that to find their true separation. Measure their separation in cm on one photo. Take the ratio of that photo distance to their true distance to find the scale of the photos. To double check your results, you may want to repeat this for a second set of points. (Both photos should have the same scale.)

Photo Scale = _____

2. **Other Photogrammetry Constants:**

a) Tape a clear overlay on top of each photo. Mark the corners in such a way that you can recenter the overlay on the photo later. Locate the principal points for each photograph, using the fiducial marks on the edges of the photographs, and mark those points with a small X on each overlay.

b) For each principal point locate the conjugate principal point on the other photograph and mark it with another small X.

c) Measure the distance between the principal and conjugate principal points on the two photos. With perfect measurements they would be the same distance If they are slightly different, produce an average and enter it below. Use the photo scale to convert that to the true "air base" distance (AB), that is, the distance the aircraft moved between photos, and enter that distance.

AB = _____ (cm on photo itself)

AB = _____ (true km)

d) Finally, using formula 2-5 from our text VE=(AB / H) * (AVD / EB), estimate the vertical exaggeration VE. Assume standard values AVD= 45 cm, EB = 6.4 cm, and, for these NAPP photographs, an altitude of 20,000 ft = 6.1 km.

VE = _____

PRECAUTIONS WHEN USING THE STEREOSCOPES:

DO NOT TOUCH THE MIRRORS: They are "first surface" mirrors with the coating on the top rather than the bottom of the glass, and are very difficult to clean without damage.

FOLLOW THE INSTRUCTIONS GIVEN VERBALLY FOR UNFOLDING THEM.

Untape the overlays and photos, then arrange the stereoscope and the stereo photos so that you can view them in 3-D. Reuse one overlay from step 2, placing it over the right or left photo (depending on whether you are right- or left-handed). Once you have them positioned, use drafting tape to hold the photos and the overlay in place on the table. In the following, limit your interpretation to the stereo portion of the coverage. You don't need the 2nd overlay any more, except perhaps as a backup in case you want to redo part of the work.

3. Geology of layered units

While Sabin's describes a first mapping step of outlining the large physiographic provinces, such as layered rocks, agricultural areas or other unconsolidated sediments, and nonlayered rocks such as granites, all of the areas of interest in this region are layered rocks, so we'll skip that first step. We'll only map the layered rocks.

Before mapping the layered rock area in detail, look for major features. This region contains both anticlines and synclines. In particular there will be a large one and two smaller ones, as part of a series of folds. The two smaller ones will be in the southeast part of the image, along (and cut off by) Shell Creek.

a. Subdivide the large (anti- or syn-)cline into at least 5 units, based on topography, texture, ridge patterns, and colors. If the boundaries pass beneath cover, but continue on the other side, connect them with dotted lines. Create a key showing the units arranged in a stratigraphic column.

b. Subdivide the two smaller (anti- or syn-)clines into two or three units each. If there are multiple thin units within these, mark them schematically. Add the information on these units to the key, and if possible, to the stratigraphic column.

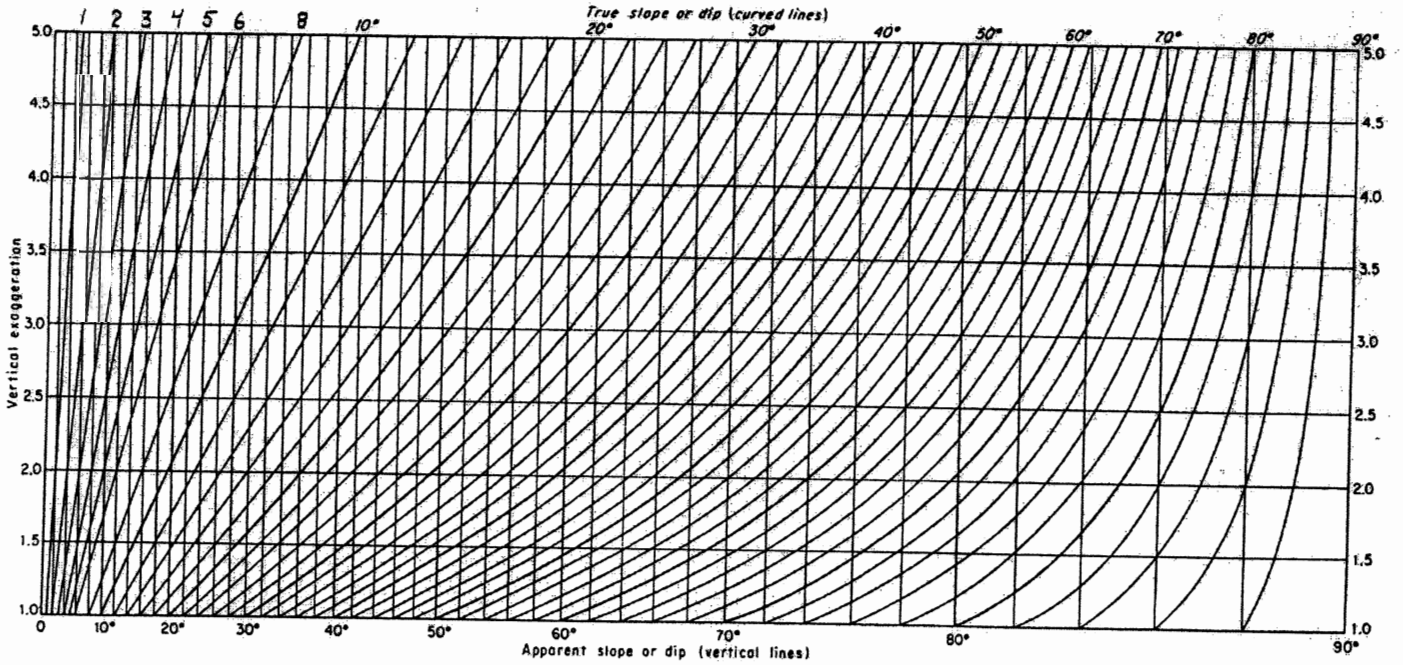
c. There are one or two "marker beds" of distinctly different color, as well as areas of dipping beds away from the anticlines and synclines. Mark those and add them to the key.

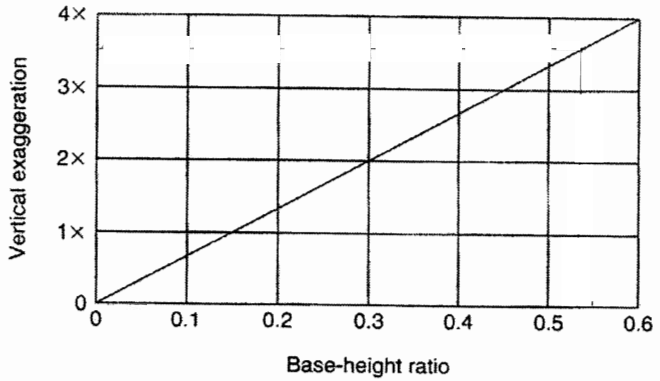
d. On the synclines, anticlines, and isolated dipping beds, identify the upper surfaces of "dip slopes", and mark these with the appropriate dip/strike symbol in enough locations to clearly define the overall pattern of synclines and anticlines.

e. Select several (3 or 4) of the more obvious dip slopes and estimate the apparent dip, then use the correction nomogram to estimate the true dip. Place the true dip number beside the symbol at each of these locations.

f. Mark the axes of the anticlines and synclines with the appropriate fold axis symbols, and show the direction of plunge with an appropriate arrow.

g. Add the symbols that you use in this interpretation to your map key.


True slope or dip (curved lines)
1
2
3
4
5
6
8
10°
20°
30°
40°
50°
60°
70°
80°
90°
Vertical exaggeration
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0
10°
20°
30°
40°
50°
60°
70°
80°
90°
Apparent slope or dip (vertical lines)


Vertical exaggeration
4×
3×
2×
1×
0
0
0.1
0.2
0.3
0.4
0.5
0.6
Base-height ratio

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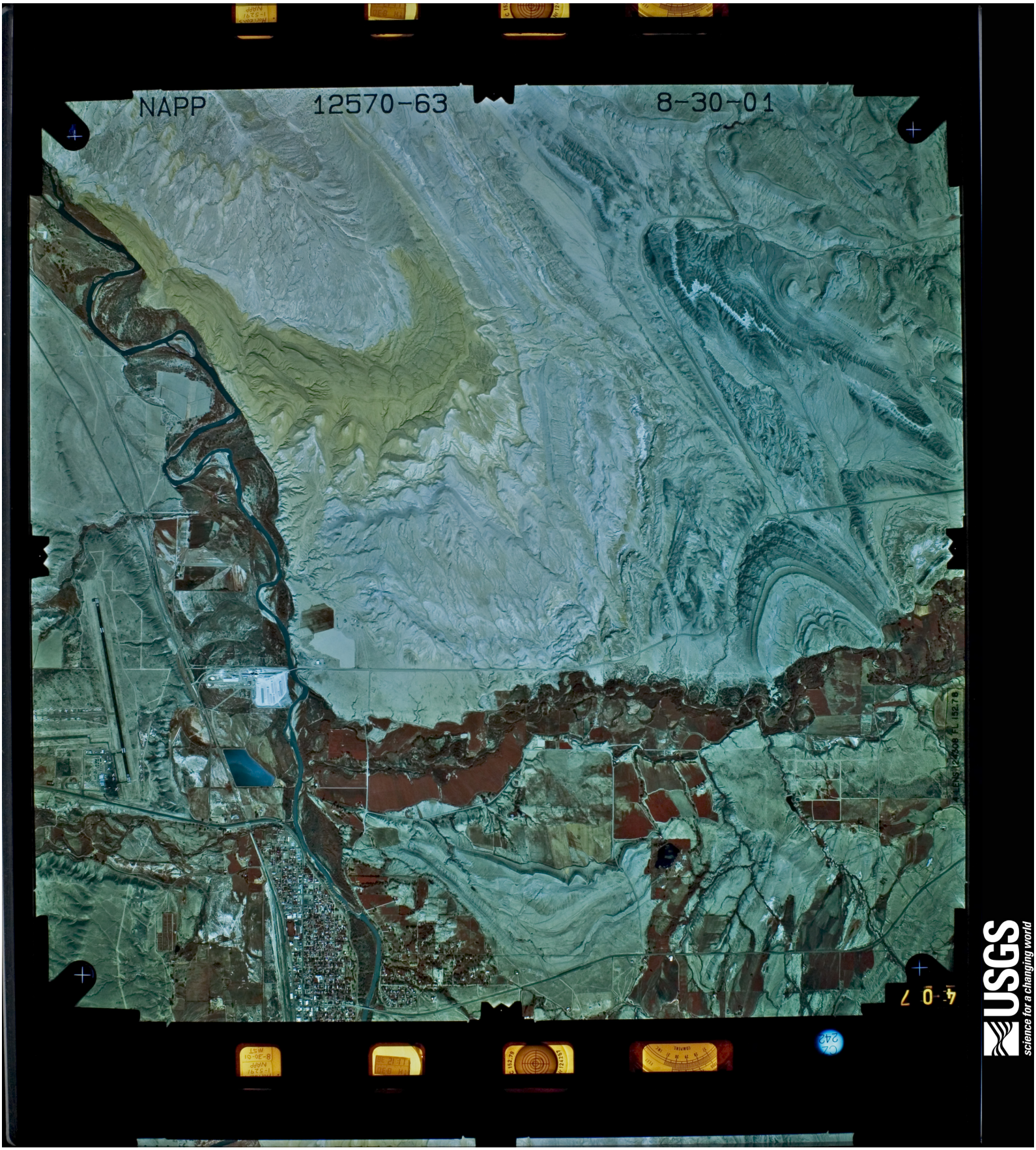
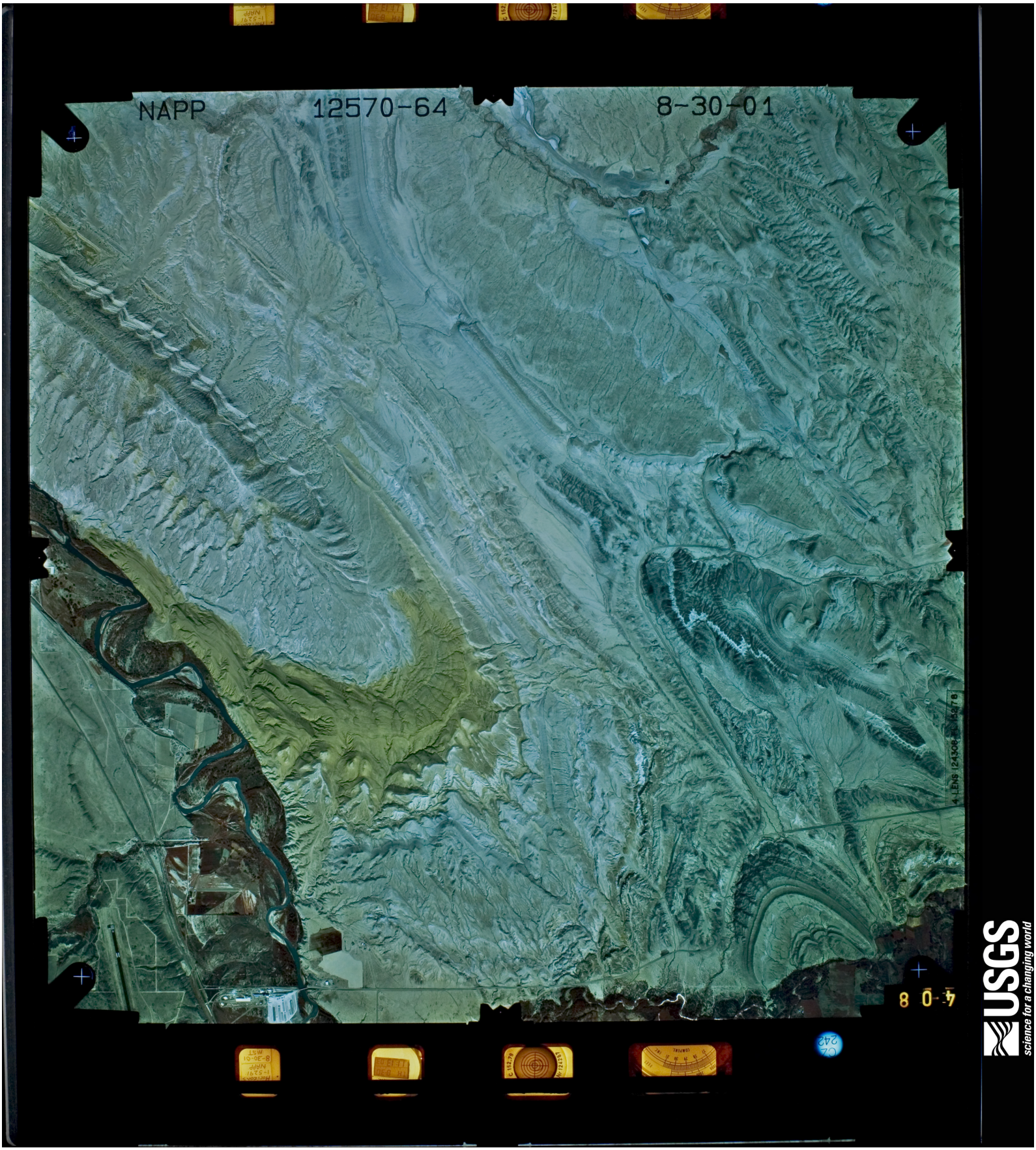
scale may be off from good copy handed out during lab




NAPP
12570-64
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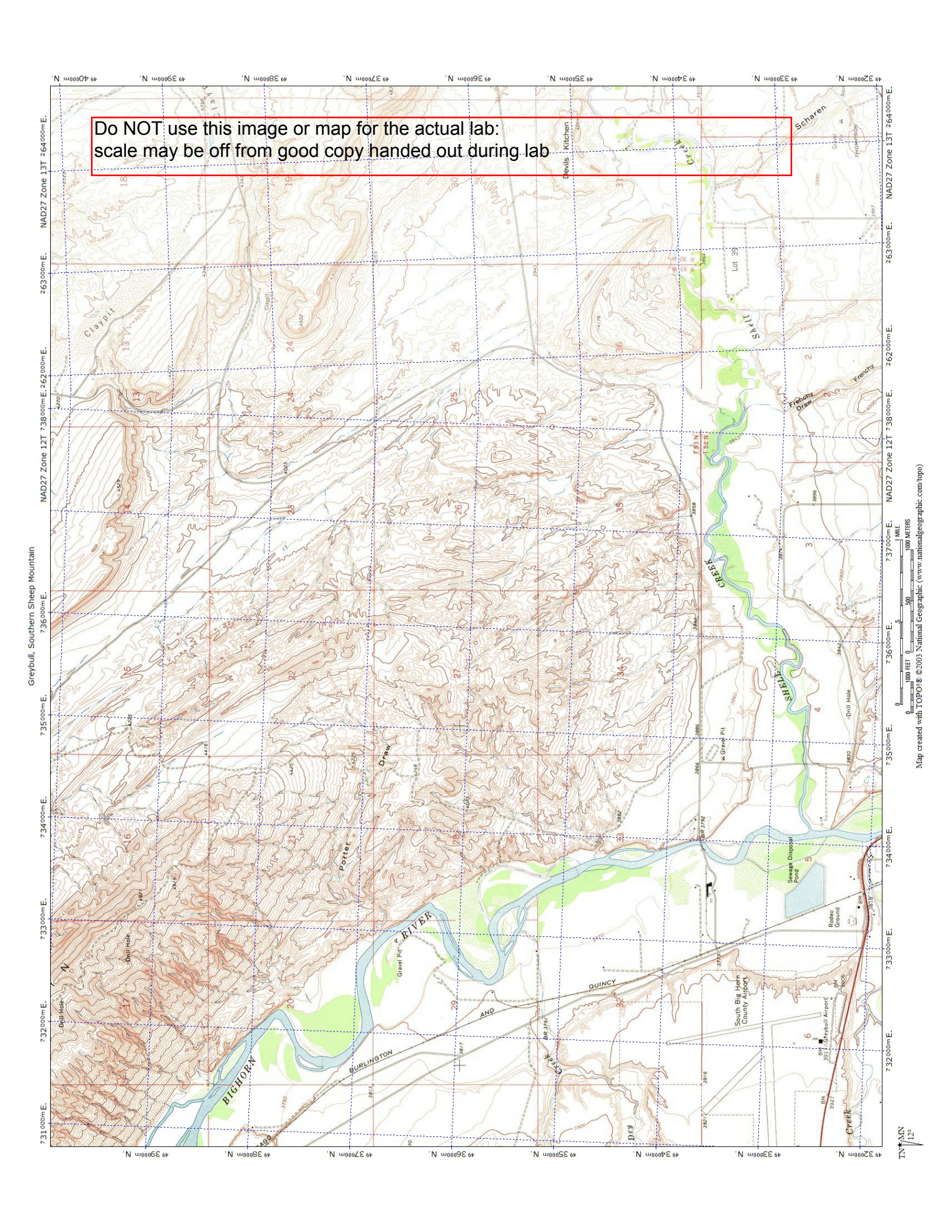
8 0-4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Greybull, Southern Sheep Mountain
NAD27 Zone 13T
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Map created with TOPO!® ©2003 National Geographic (www.nationalgeographic.com/topo)
BIGHORN RIVER
BURLINGTON AND QUINCY
Shell Creek
Porter Draw
Frenchy Draw
Devils Kitchen
Claypit
Scharen
Lot 39
South Big Horn County Airport
Greybull Airport
Sewage Disposal Pond
Rodeo Ground
Gravel Pit
Drill Hole