

# Managing Hydropower Project Boundaries & Exhibit Drawings



**C. Kirk Cover, P.E.**

**NW Hydroelectric Assn Conference**

**March 1-3, 2005**

---

## Federal Power Act Sec 3(11) Project Definition



Federal Power Act defines a hydropower project as a complete improvement consisting of a power house, water conduits, all dams, transmission lines, . . . **lands, or interest in lands the use and occupancy of which are necessary or appropriate in the maintenance and operation of such unit;**

# 18 C.F.R. §4.39



## **§ 4.39 Specifications for maps and drawings.**

All required maps and drawings must conform to the following specifications, except as otherwise prescribed in this chapter:

(a) Each original map or drawing must consist of a print on silver or gelatin 35mm microfilm mounted on Type D (3 1/4 inches by 7 3/8 inches) aperture cards. Full-sized prints of maps and drawings must be on sheets no smaller than 24 by 36 inches and no larger than 28 by 40 inches. A space five inches high by seven inches wide must be provided in the lower right hand corner of each sheet. The upper half of this space must bear the title, numerical and graphical scale, and other pertinent information concerning the map or drawing. The lower half of the space must be left clear. Exhibit G drawings must be stamped by a Registered Land Surveyor. If the drawing size specified in this paragraph limits the scale of structural drawings (exhibit F drawings) described in paragraph (c) of this section, a smaller scale may be used for those drawings. Potential applicants or licensees may be required to file maps or drawings in electronic format as directed by the Commission.

(b) Each map must have a scale in full-sized prints no smaller than one inch equals 0.5 miles for transmission lines, roads, and similar linear features and no smaller than one inch equals 1,000 feet for other project features, including the project boundary. Where maps at these scale do not show sufficient detail, large scale maps may be required. Each map must show:

...

(e) The maps and drawings showing project location information and details of project structures must be filed in accordance with the Commission's instructions on submission of Critical Energy Infrastructure Information in § 388.112 and 388.113 of subchapter X of this chapter.

## 18 C.F.R. §4.39

### Specifications for Maps and Drawings



- Paper copies & drawing scale described
- Aperture card specifications described
- Electronic format filing may be required
- Exhibit G stamped by Registered Land Surveyor
- Label certain project information/details as Critical Energy Infrastructure Information (CEII) or Non Internet Public(NIP) [see §388.112 and §388.113(c)]

# 18 C.F.R. §4.41



## **§ 4.41 Contents of application.**

(h) Exhibit G is a map of the project that must conform to the specifications of § 4.39. In addition to the other components of Exhibit G, the applicant must provide the project boundary data in a georeferenced electronic format - such as ArcView shape files, GeoMedia files, MapInfo files, or any similar format. The electronic boundary data must be positionally accurate to  $\pm 40$  ft, in order to comply with the National Map Accuracy Standards for maps at a 1:24,000 scale (the scale of the USGS quadrangle maps). The electronic exhibit G data must include a text file describing the map projection used (i.e., UTM, State Plane, Decimal Degrees, etc.), the map datum (i.e., North American 27, North American 83, etc.) and the units of measurement (i.e., feet, meters, miles, etc.). Three sets of the maps must be submitted on CD or other appropriate electronic media. If more than one sheet is used for the paper maps, the sheets must be numbered consecutively, and each sheet must bear a small insert sketch showing the entire project and indicating that portion of the project depicted on that sheet. Each sheet must contain a minimum of three known reference points. The latitude and longitude coordinates, or state plane coordinates, of each reference point must be shown. If at any time after the application is filed there is any change in the project boundary, the applicant must submit, within 90 days following the completion of project construction, a final exhibit G showing the extent of such changes. The map must show: . . .

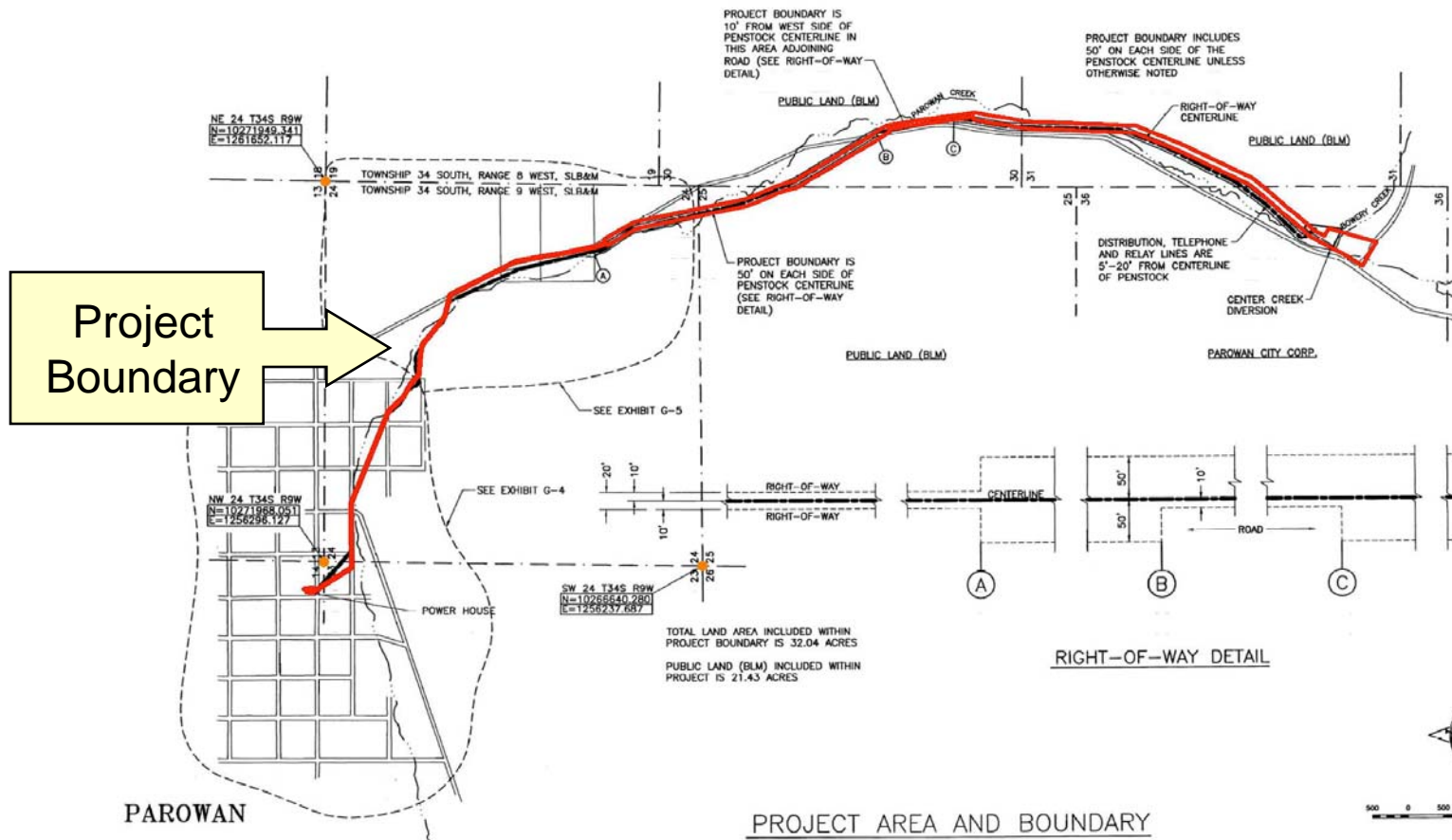
# 18 C.F.R. §4.41

## Project Boundary Requirements



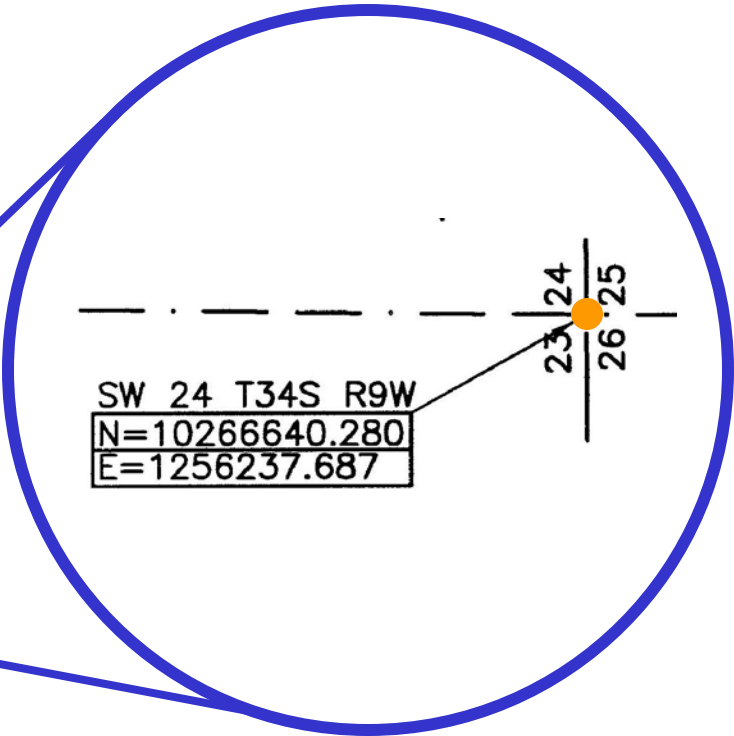
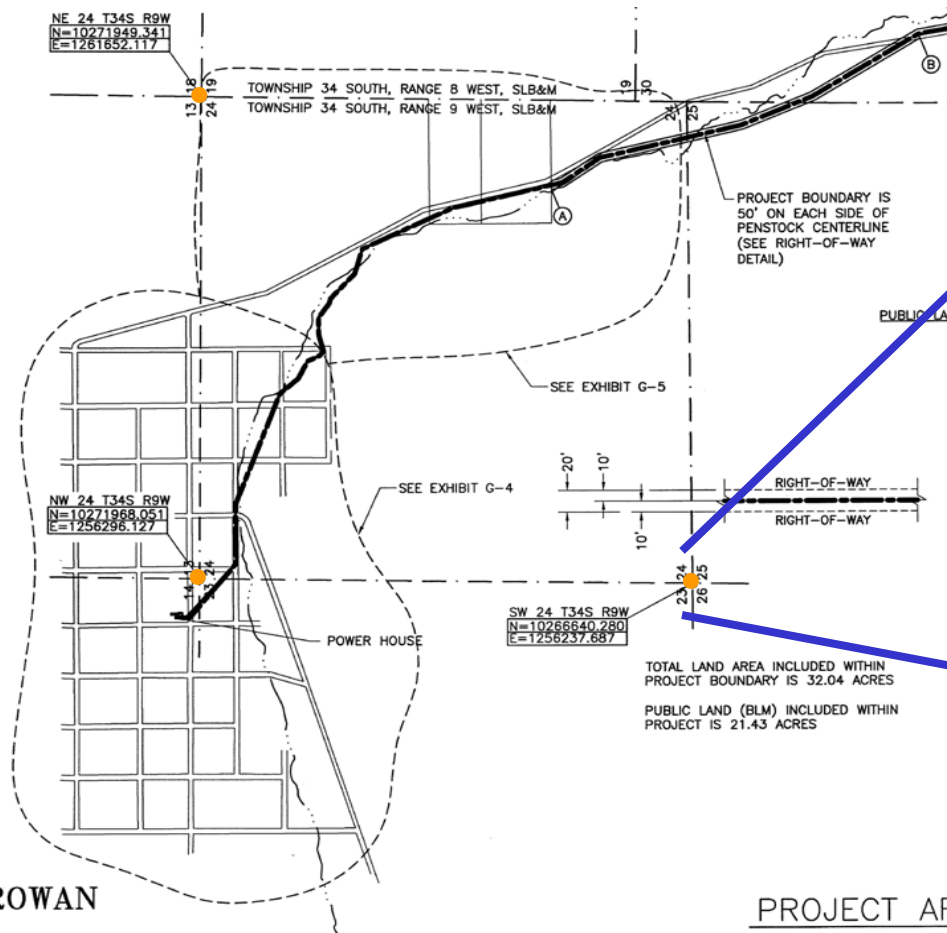
- All projects must define a project boundary (licenses and exemptions)
- Projects on federal lands must include certain information §4.81(b)(5) – FERC Form-587
- Exhibit G's must have three reference points on each drawing (Latitude/Longitude, etc.)
- Geo-referenced electronic format required w/GIS metadata text file that describes map details

# Electronic Project Boundary TIFF file & GIS Vector Data



FERC

# GOOD example of Boundary Reference Points

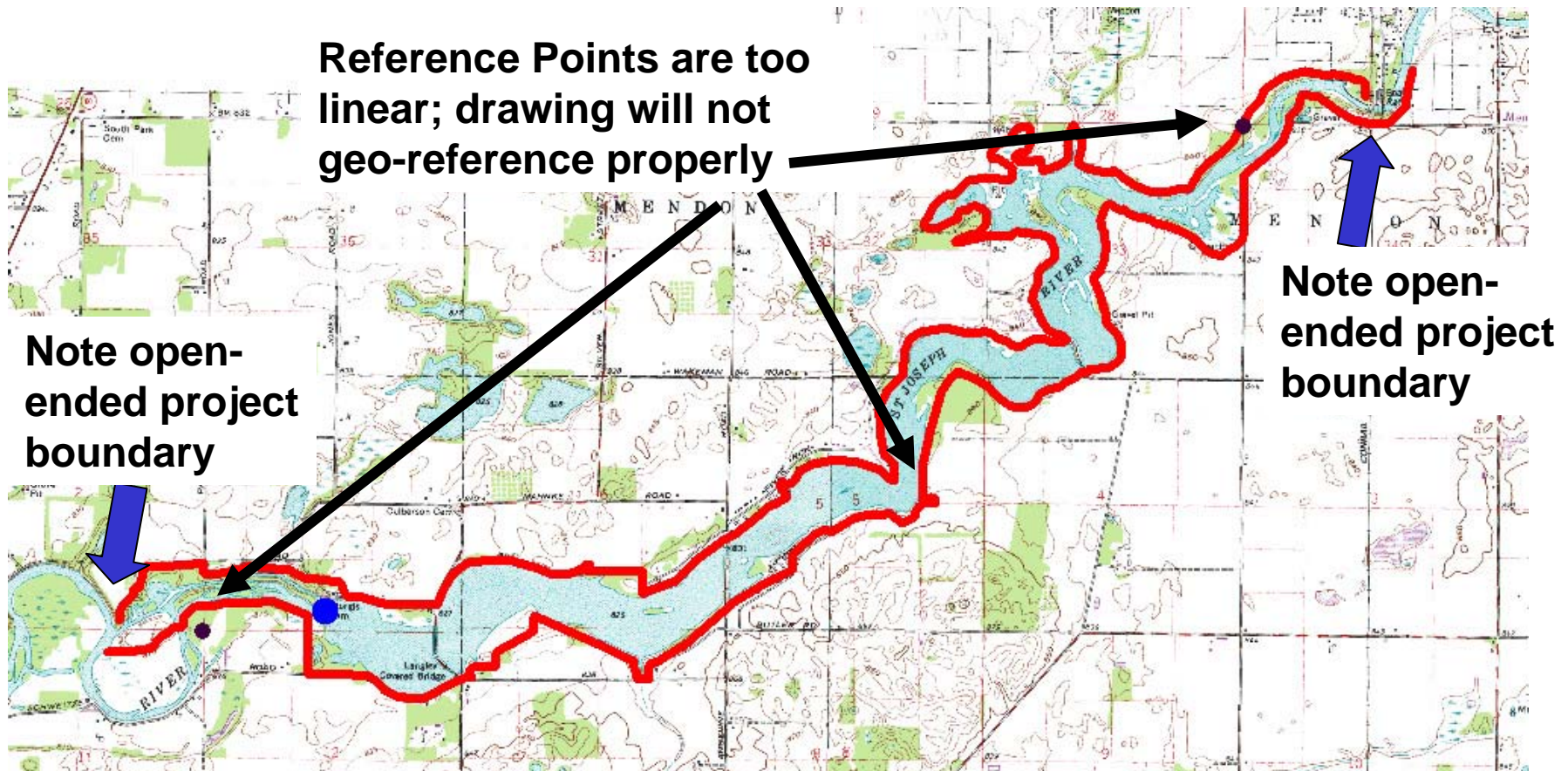


PAROWAN

PROJECT AR

Office of Energy Projects

# Example of Unacceptable Project Boundary



## Summary – Exhibit G's



- **MUST** be drawn to scale
- **MUST** have a Register Land Surveyor's stamp
- **MUST** have a closed boundary
- **MUST** have minimum of three control points
  - **MUST** specify datum (LAT/LONG, etc.)
  - Points **MUST** be dispersed in a triangular manner

# Summary – License and Exemption APPLICATIONS



- Exhibit drawings can be filed in paper, electronic, or aperture card format
- Electronic format includes PDF, JPG, and TIFF
- Exhibit F's MUST be labeled **CEII** (§388.112), Exhibit G's labeled **NIP** (§388.113(c))
- ALL projects require a project boundary
- Project boundary vector file required in GIS format

*FERC*

---

# Summary – License and Exemption **ISSUANCE**



- All exhibit drawings (F's & G's) required in microfilm and electronic TIFF format, GIS boundary vector file, and metadata
- FERC Form-587 required if on federal lands
- If information on drawings does not comply with regulations, FERC will NOT accept

# Summary – Post License/Exemption **AMENDMENTS**



- Any change in project boundary triggers the electronic filing requirement
- If one project boundary exhibit changes, all exhibits are required in electronic TIFF format
- Project boundary vector file is required in GIS format

# Why is FERC doing this to us?



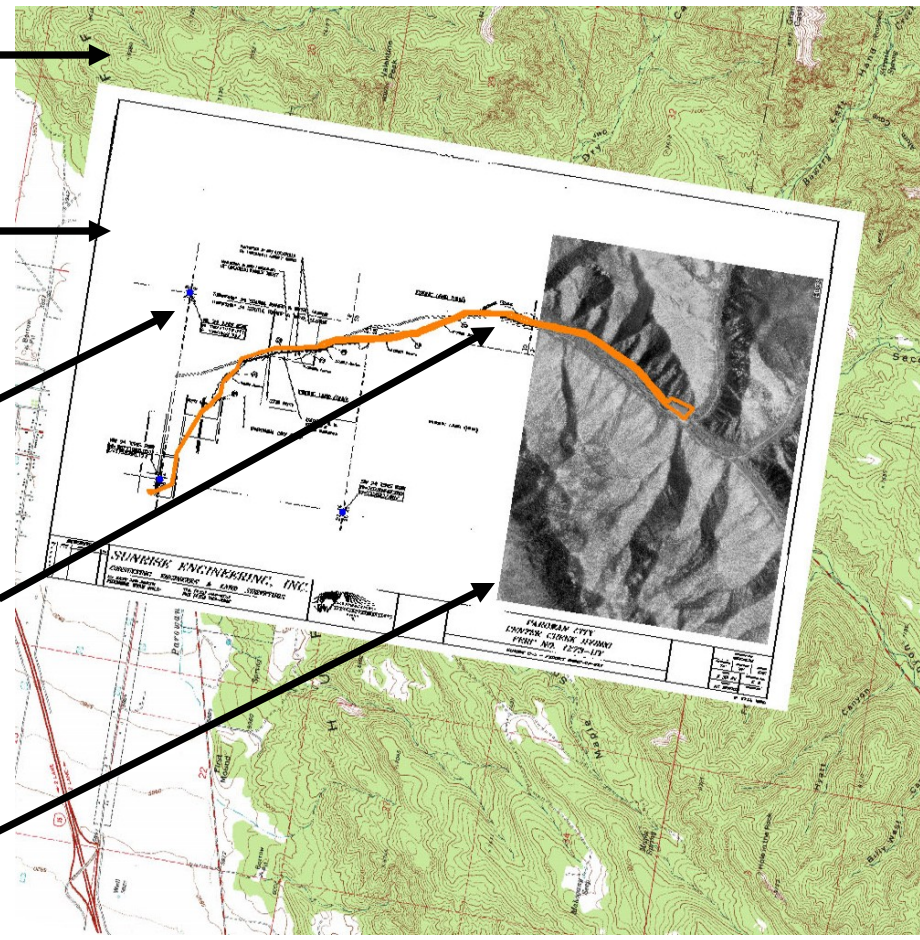
USGS Topographic Map

Exhibit G

Reference Points (LAT/LONG)

Project Boundary Vector Data

Ortho Photo Map

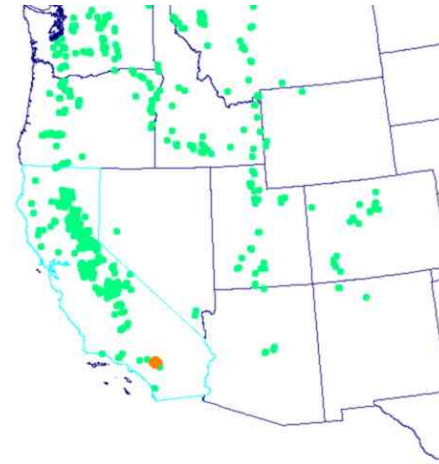
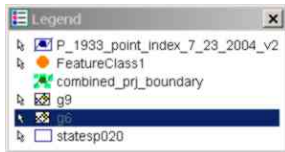


# Benefits of Accurate Project Boundaries



- Verify location of all project features
- Verify all projects have an enclosed boundary
- Verify acreage of federal lands for annual charges
- Help licensees/exemptees manage their projects
- FERC is able to conduct more intensive analysis if necessary (e.g., erosion, flooding, acreage analysis)

# TIP # 1 – VERIFY ALL WORK



Here's the location point file for P-1933 loaded into our GIS system. A little off!



Check all Information before filing with the Commission, it can be embarrassing if you don't

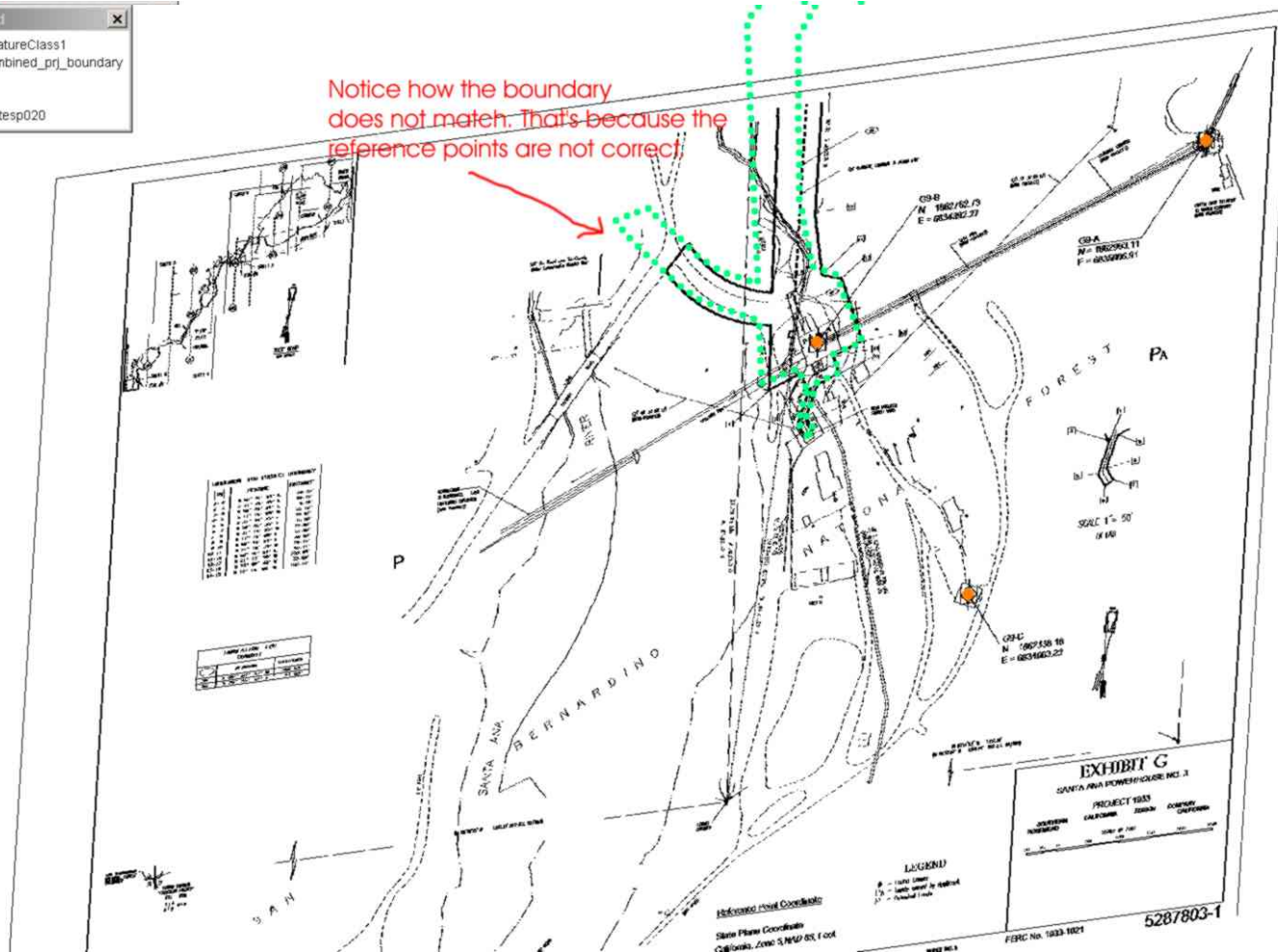
# TIP # 2 – USE GOOD REFERENCE POINTS



Legend

- FeatureClass1
- combined\_prj\_boundary
- g9
- g6
- statesp020

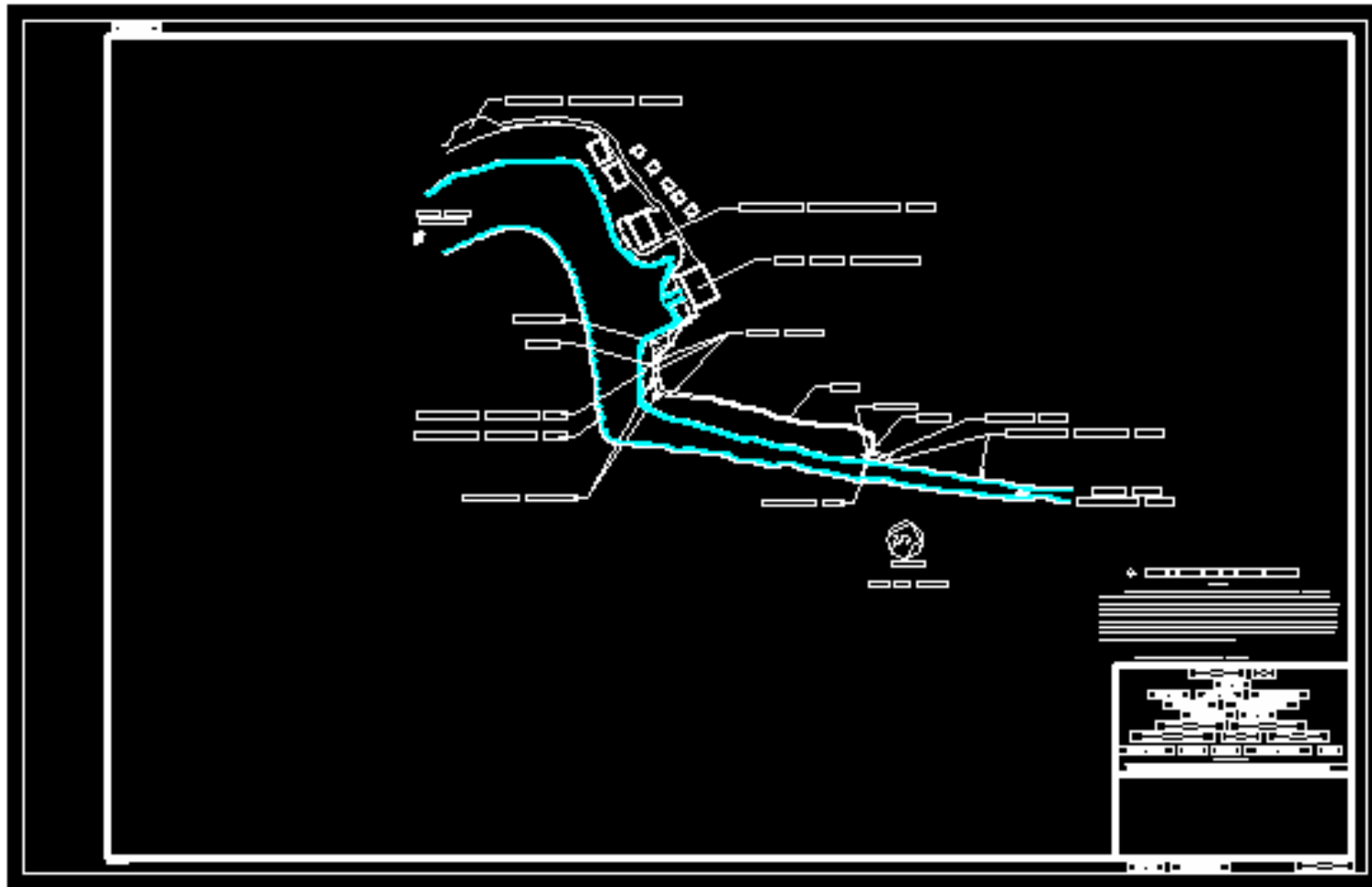
Notice how the boundary does not match. That's because the reference points are not correct.



FERC

---

# TIP # 3 – CHECK QUALITY OF EXHIBITS (must be legible)

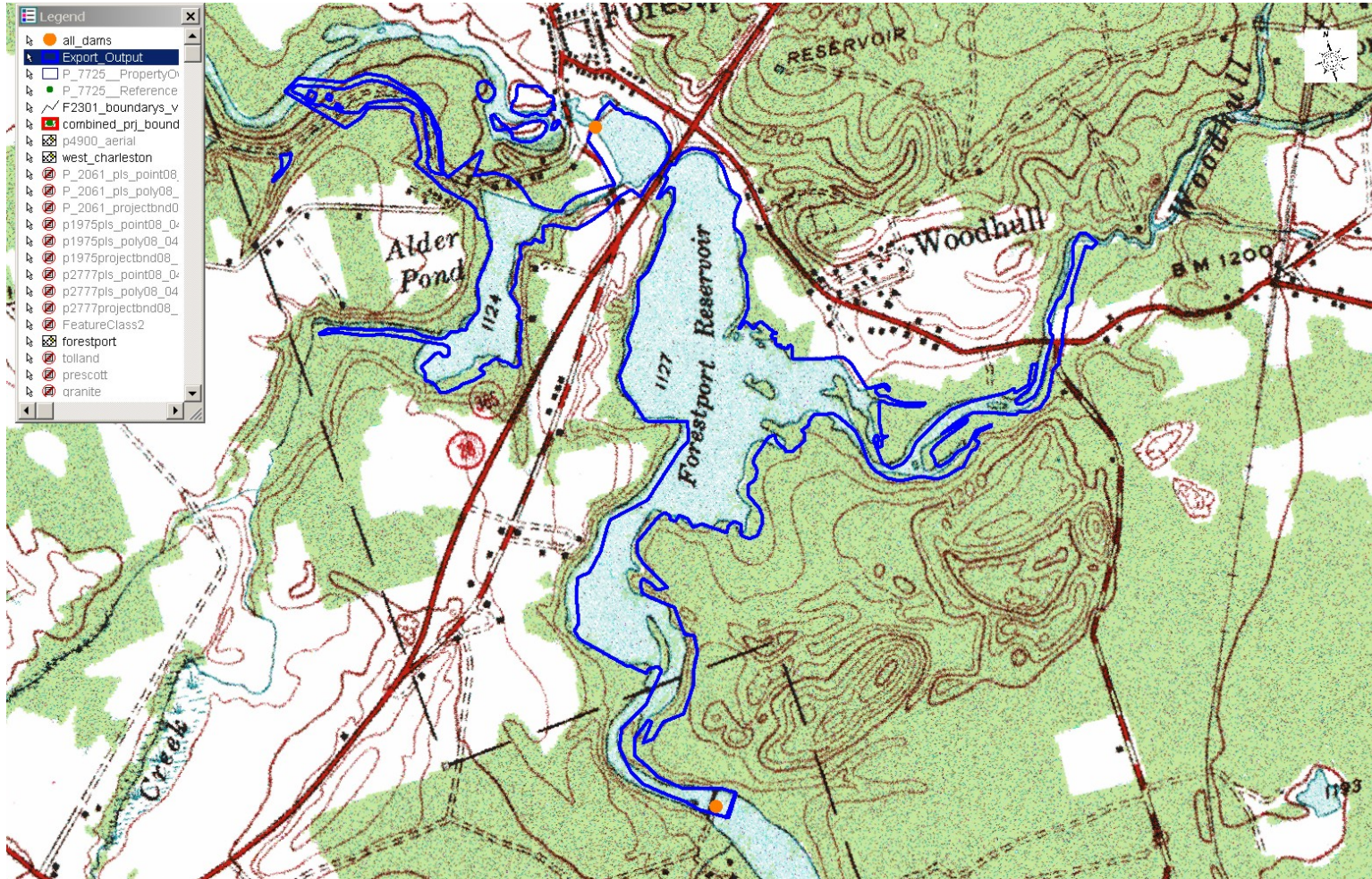


---

*Office of Energy Projects*

FERC

# Tip # 4 – ASSUME FERC CHECKS ALL WORK – BECAUSE WE DO!



Office of Energy Projects

## Tip # 5 –KEEP IT SIMPLE



- Minimize layers of GIS data filed
- Metadata files only require three short lines
  - Reference system (e.g., **Idaho State Plane**)
  - Orientation (e.g., **NAD 83**)
  - Measurement system (e.g., **feet**)
- Don't get talked into expensive survey work
- Pay attention to "file names" and make sure they are correct

## Tip # 6 – USE FERC RESOURCES



FERC staff is **ALWAYS** available to answer questions you may have when preparing project boundary maps or GIS information

[http://www.ferc.gov/industries/hydropower/enviro/drawings\\_guide.pdf](http://www.ferc.gov/industries/hydropower/enviro/drawings_guide.pdf)