

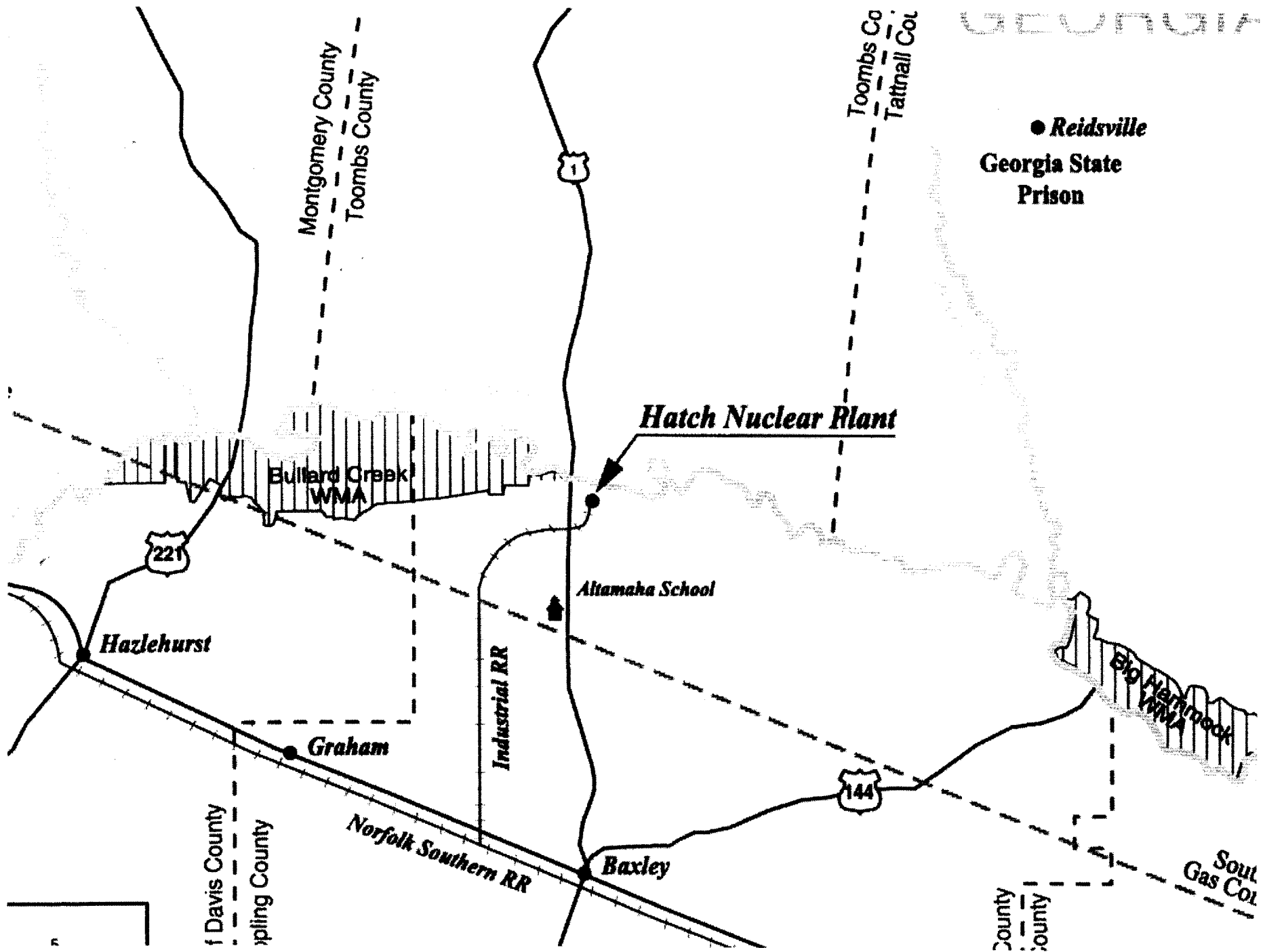
Biological Information Update

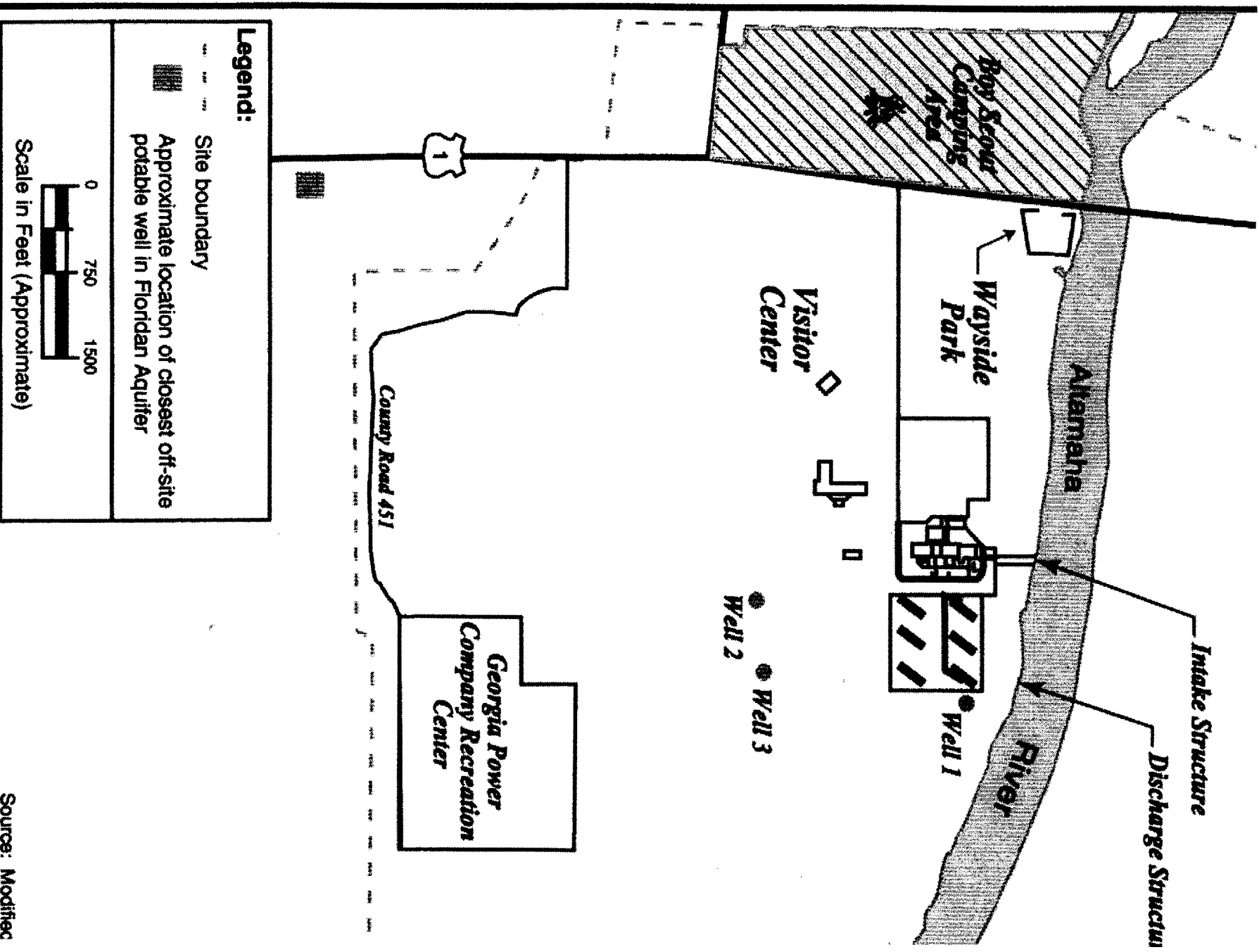
March 22, 2001



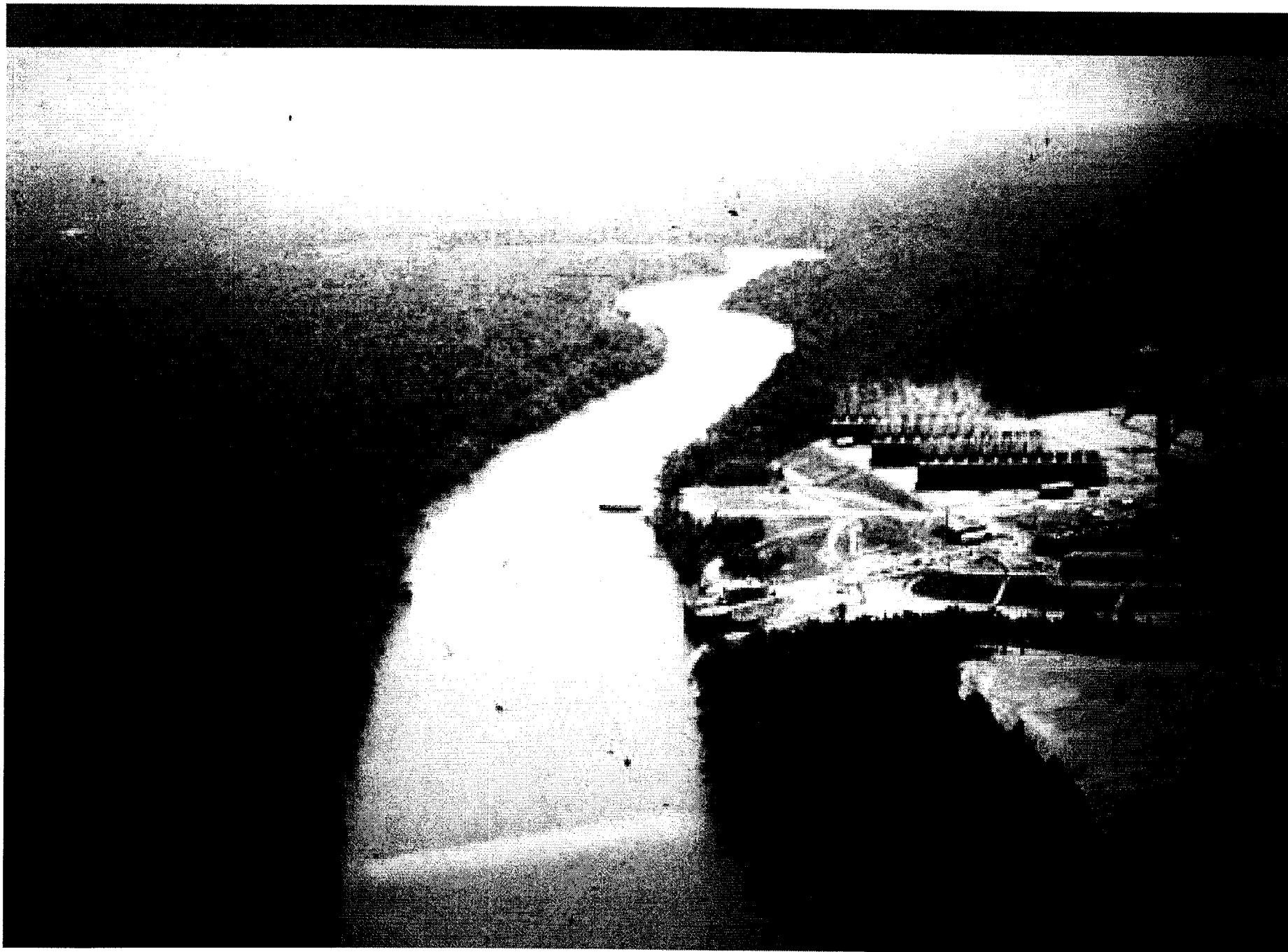
Points of discussion

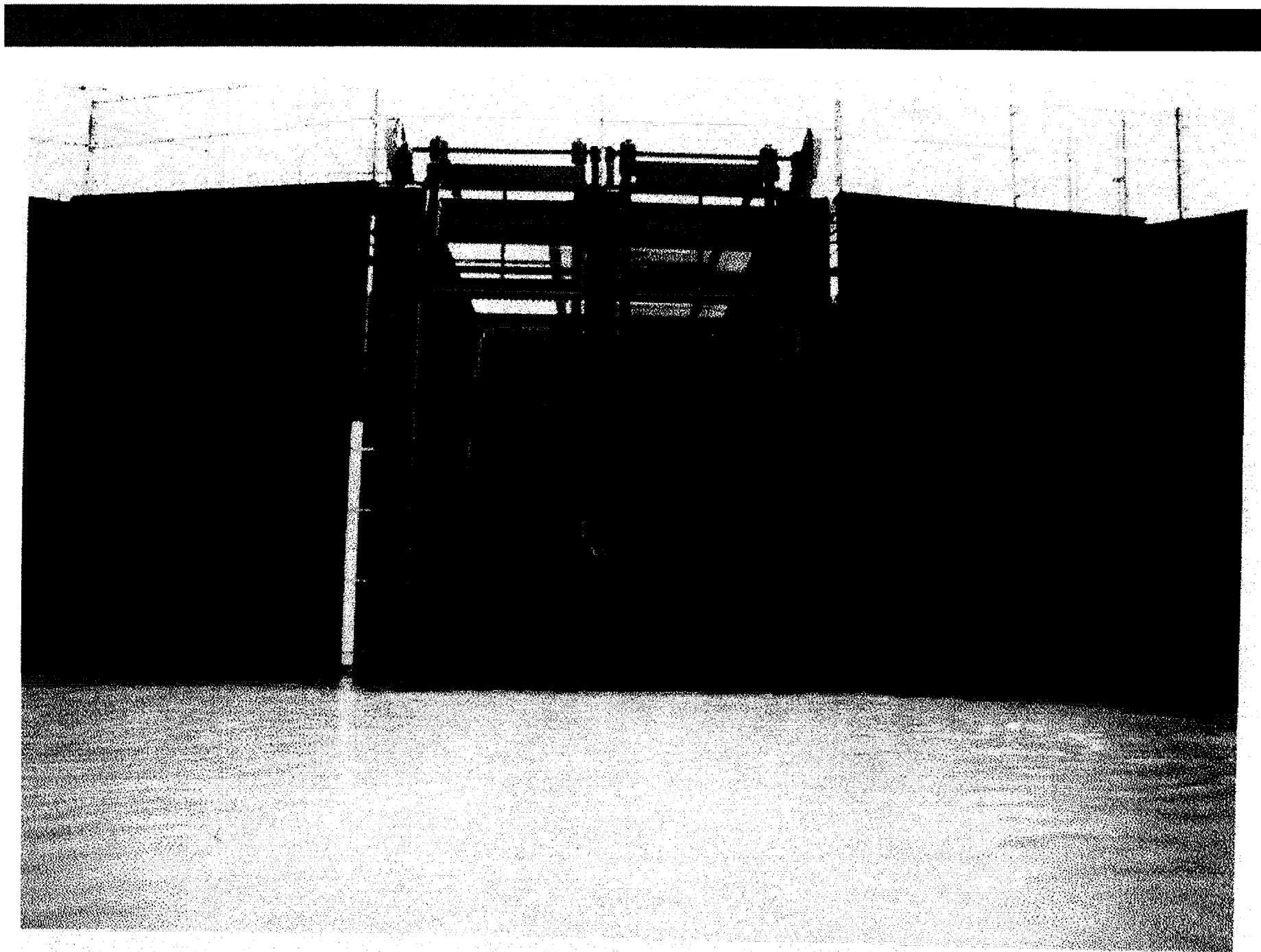
- Update previous submitted information
- Review existing information
- Visit intake and discharge structure





Source: Modified





Intake structure velocities

- Intake velocities where calculated using 100 cfs pumping capacity and the cross section of the intake structure.

$$V = \frac{Q}{Area} \text{ ft / sec}$$

- Q = pumping rate in cubic feet per second
- Area = cross section area of intake

Intake velocities at specified river elevations, 2 unit operation

Velocity = Q/A

Pump data from Table 3-2 HNP surface water use, 1989-1997

Average	57.2 MGD	Maximum	85.31 MGD
	89 cfs		132 cfs

River

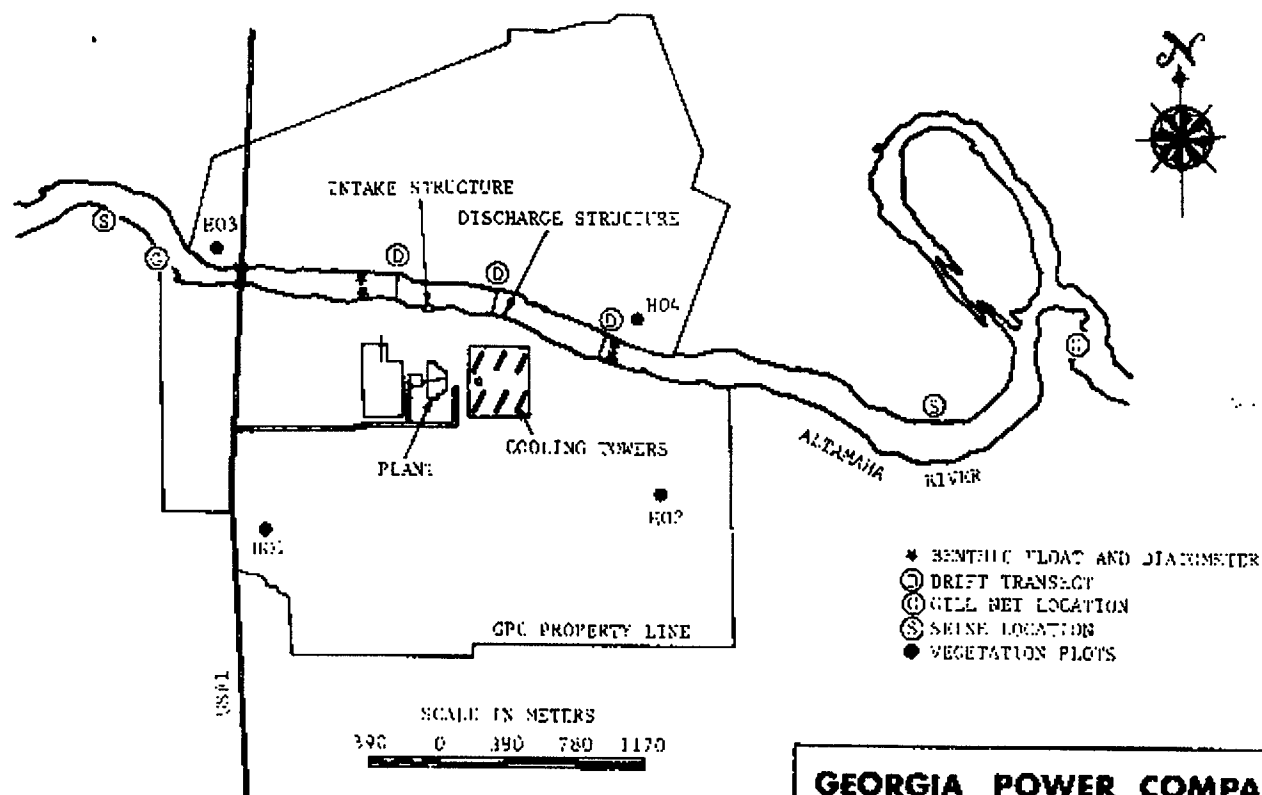
Elevation	Velocity fps	Velocity fps
62	0.80	1.20
62.4	0.75	1.12
63	0.69	1.03
64	0.60	0.90
65	0.54	0.80
66	0.48	0.72
67	0.44	0.65
68	0.40	0.60
69	0.37	0.55
70	0.34	0.51
71	0.32	0.48
72	0.30	0.45
73	0.28	0.42
74	0.27	0.40
75	0.25	0.38
76	0.24	0.36
76.25	0.24	0.36

Measured versus predicted intake velocities

Date	3/19/01	
	Intake	Intake
Depth from	1A	2A
surface	Velocity	Velocity
(feet)	(feet/sec)	(feet/sec)
3	0.22	0.45
6	-0.16	0.76
9	-0.22	-0.80
12	-0.17	-0.77
15	0.20	-0.20
18	0.54	0.56
River Stage	76.25 feet	
Pump Rate	36.8 thousand gallon/minute	
	53 MGD	
Average Measured	0.03 feet / sec	
Standard Approach Velocity	0.22 feet / sec	

Historic Data

- **Adult fish collection**
- **Juvenile fish collection**
- **Drift surveys**
- **Impingement collection**
- **Thermal Plume surveys**



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ANNUAL REPORT 1976

LOCATION OF BIOLOGICAL
MONITORING STATIONS DURING 1976

FIGURE 4.0-1.

Fish Collections

- Adult fish collected 1972 to 1976
- Consisted of 18 collection periods
- River Mile 113.4 (downstream) and RM 117.4 (upstream)
- Four 200x8 foot monofilament gill nets (2, 3, 4, and 5 inch stretched mesh)
- 12 hour sets
- Supplemented by electrofishing

Fish Collections

- Juvenile fish collected 1974-1976
- 14 collection periods, primarily April - Sept.
- 100 foot 0.25 inch bar mesh seine
- Above and below Plant Hatch

Drift Collections

- **Preoperational**
 - Weekly February-May, 1973, every 6 weeks June-Dec, 1973
 - Weekly February-June, 1974
- **Unit 1 operation**
 - Weekly February- June, 1975
- **Unit 1 and 2 operation**
 - monthly in 1979 and 1980

Entrainment

- Calculated from density of drift, river discharge, and pumped volume
- All drift densities combined because of low numbers

$$Entrainment_{month} = \frac{VolumePumped_{month}}{RiverVolume_{month}} \cdot Density_{month} * RiverVolume_{month}$$

Impingement Collections

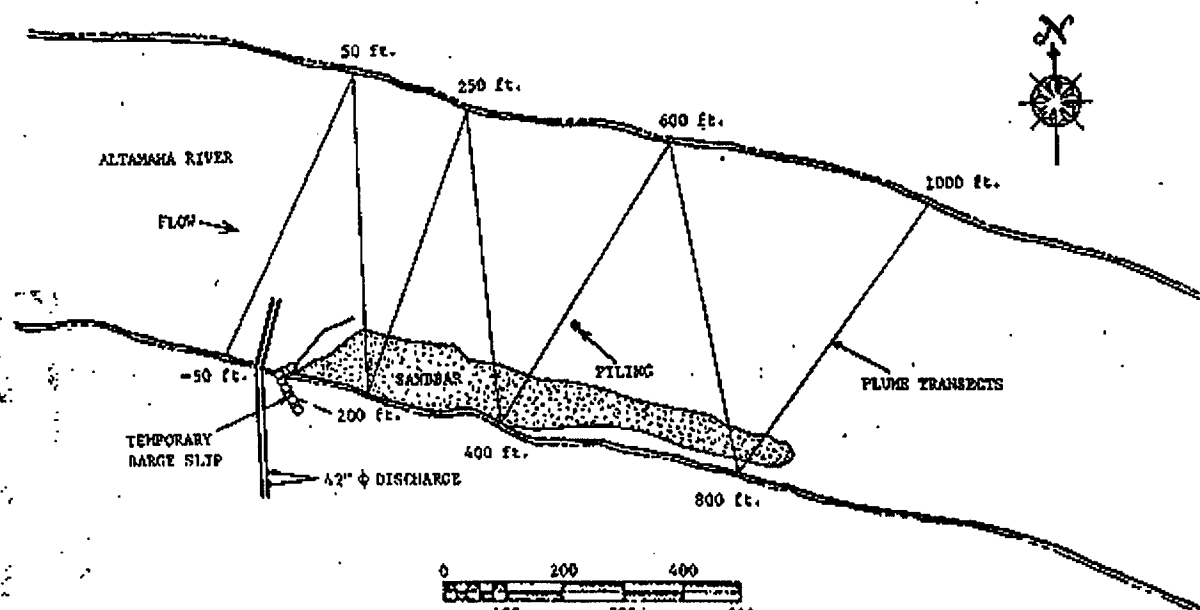
- Used 3/8 inch basket to collect all backwash for 24 hours
- Weekly collections 1975, 1976, and 1977
- Monthly collections 1979 and 1980

Temperature Monitoring

- Continuous monitoring in mixing zone for 1975, 1976, 1978, and 1979.
- Weekly surveys of intake, mixing chamber, downstream edge of mixing zone during 1977, 1978, 1979, 1980.

Thermal Plume Modeling

- **Verification surveys in 1976 (7), 1977 (2), 1979 (3), 1980 (12).**
- **In some cases, surveys conducted when conditions not appropriate for model verification:**
 - **only one set of cooling towers discharging**
 - **no measurable thermal discharge**
 - **extent of plume not definable due to solar heating of sandbar**



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ALTAMAH RIVER THERMAL PLUME TRANSECTS
FIGURE 1.2-1

