Environmental Radiation Monitoring in North Carolina:

An Overview

Program History

- 1958-Environmental Program begun to respond to fallout from weapons testing.
- 1962-Rain water samples from Ocracoke added.
- 1963-Other rainfall, air and other dust samples included in the program.
- 1964-Six milk locations added.
- 1967-Salt water, shellfish and bottom sediment samples added.
- 1973-Nuclear facility monitoring begun at GE, BR and PS sites.
- 1974-SW Fong assumes direction of program.
- 1976-Statewide gamma survey & addition of McGuire to monitoring program.

Program History, Continued

- 1979-Three Mile Island Nuclear Power Plant Accident
- 1980-Rad Assessment of Texas Gulf & NCPC, Response to Brunswick Landfill
- 1986-NRC Contract Begins, Chernobyl Event
- 1989-Steam Generator Tube Rupture at McGuire Nuclear Station
- 1990-Radiation Protection Section becomes Division of Radiation Protection
- 1997-NRC Contract Ends
- 1998-Low Level MSIV Release at Brunswick confirmed by DRP.
- 2000-DRP merged into DEH and becomes Radiation Protection Section.

Current Program Overview

Environmental Monitoring in NC Is a Collaborative Effort between:

- Radiation Protection Section (RPS)
- State Public Health Laboratory's Radiochemistry Laboratory
- Local government health and environmental protection agencies.

Program Overview II - Relationship

- **RPS** coordinates collection of **environmental samples**
- **Radiochemistry** analyzes samples for radioactivity and provides results of analyses to RPS in electronic format.
- RPS collates/analyzes results for trends over time, public dose/exposure, regulatory limits, and public risk.
- The results published yearly in RPS Environmental Radiation Surveillance Report. Sample analysis data is also shared on a more frequent basis (at least quarterly) with local government agencies.

Program Overview III - Basic Facts

- **Sample collection:** Collection of samples is conducted by RPS personnel, local health departments, local environmental protection agencies, public utilities, and private electric utilities.
- Samples are collected in the immediate areas surrounding nuclear facilities (e.g. nuclear power plants), and various locations statewide.
- These "statewide" locations include locations of high potential public impact such as major public water supplies.
- Atmospheric fallout is monitored by periodic air monitoring conducted at 10 locations statewide. Similar statewide networks exist for other sample media.
- RPS collects approximately 2800 samples program-wide a year!

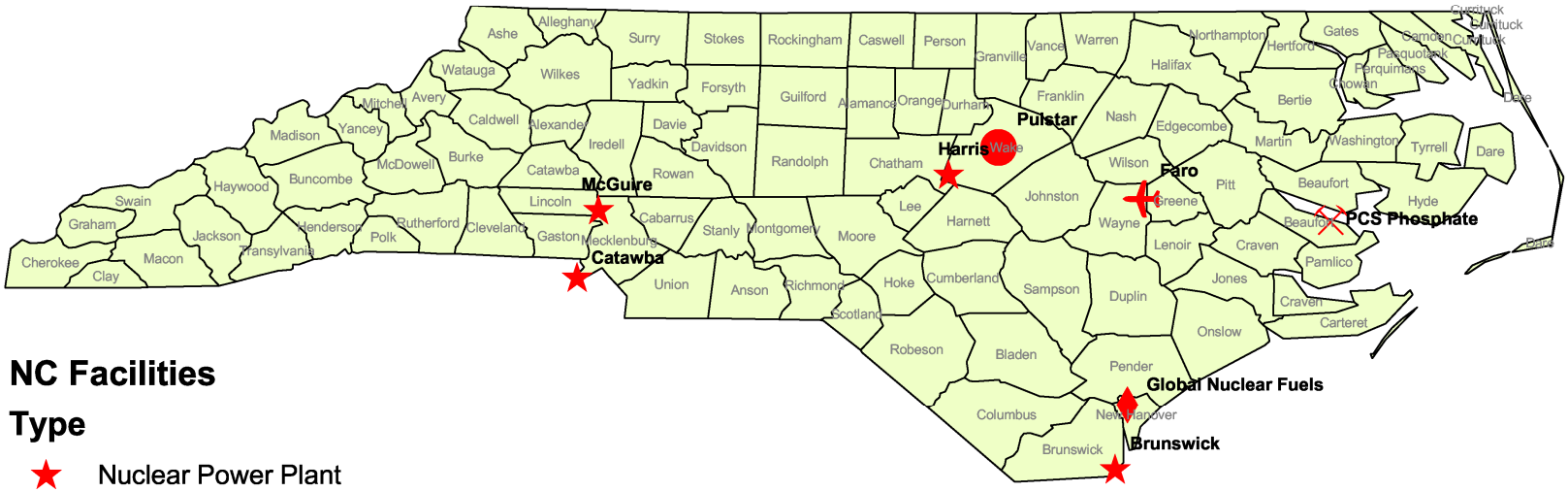
Facility Sites

Nuclear Power Plants:	Brunswick
(5 Reactors in NC*)	Harris
	McGuire
	Catawba
Fuel Facility:	Global Nuclear Fuels
Other Facilities:	PCS Phosphate
	Pulstar
	Faro (B-52 Crash)

*Supply 32.1% of the electricity generated in NC vs. 20% nationally.

Facilities

NC Nuclear Facilities



NC Facilities

Type

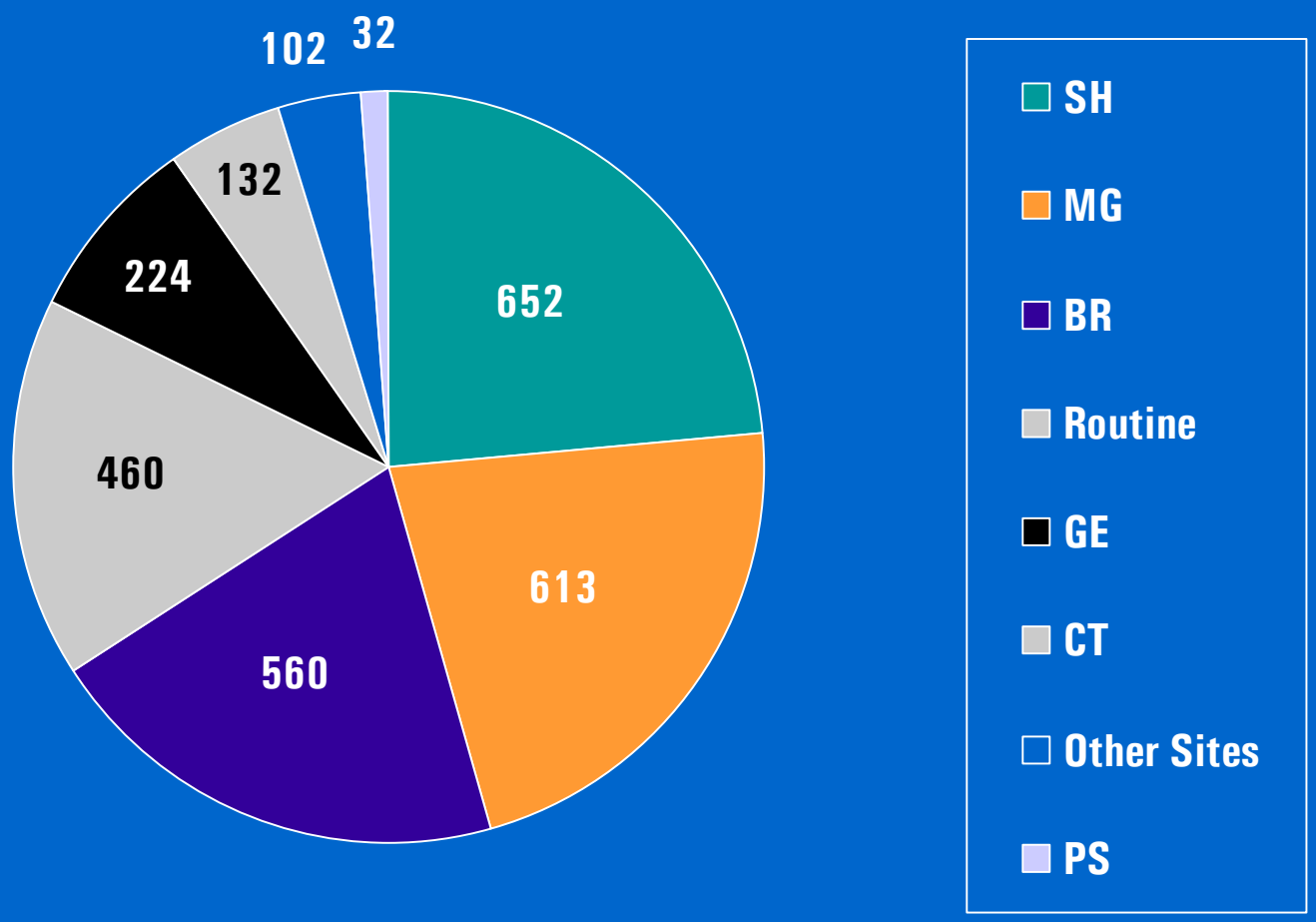
- ★ Nuclear Power Plant
- ♦ Nuclear Fuel Fabrication Facility
- ● Nuclear Research Reactor
- ✈ Nuclear Weapons Crash Site
- ⚒ TENORM

2003 Scheduled Sampling Totals

	Routine	Other Sites	BR	GE	MG	PS	CT	SH	Total Year
Air Particulate	120	12	260	156	260	8	104	260	1180
Air Iodine	0	0	104	0	104	0	8	104	320
Milk	60	0	0	0	12	0	0	12	84
Finished Water	108	0	0	0	0	0	0	0	108
Raw Surface Water	84	4	26	20	60	4	0	68	266
Groundwater	0	8	8	14	0	0	0	20	50
Precipitation	36	0	0	0	0	0	0	0	36
Sewage Effluent	48	0	0	0	0	0	0	0	48
Sediment	0	2	2	6	5	0	0	8	23
Shellfish or Fish	4	0	12	0	6	0	0	12	34
Soil	0	2	0	4	0	0	0	0	6
Vegetation or Food	0	2	4	4	6	0	0	4	20
TLD	0	0	148	20	160	20	20	164	532
Rn in Structures	0	72	0	0	0	0	0	0	72
Total for Year	460	102	560	224	613	32	132	652	**2779**

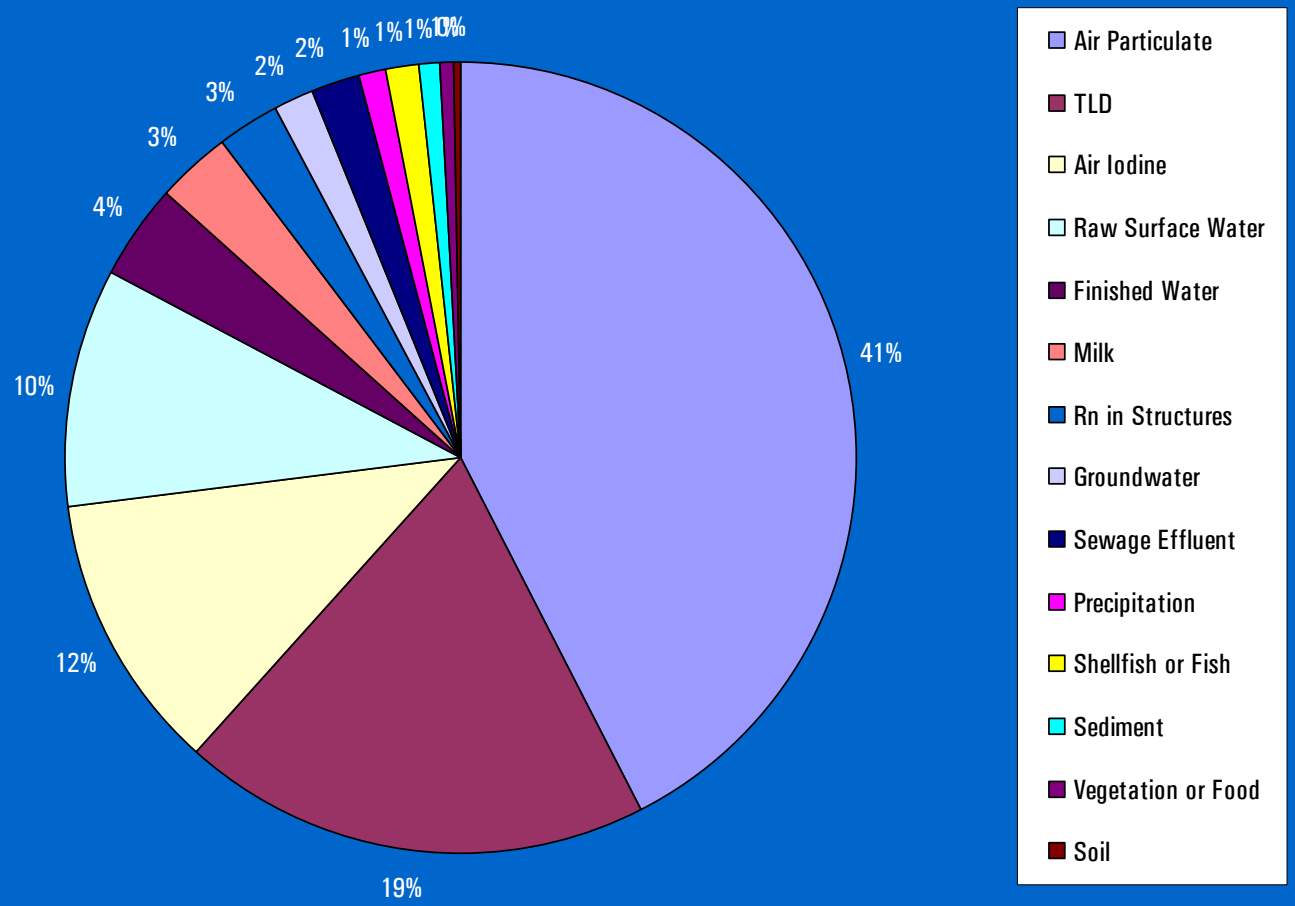
Sampling Totals By Facility

Total number of samples scheduled to be collected at each facility in 2003



Samples Collected By Media

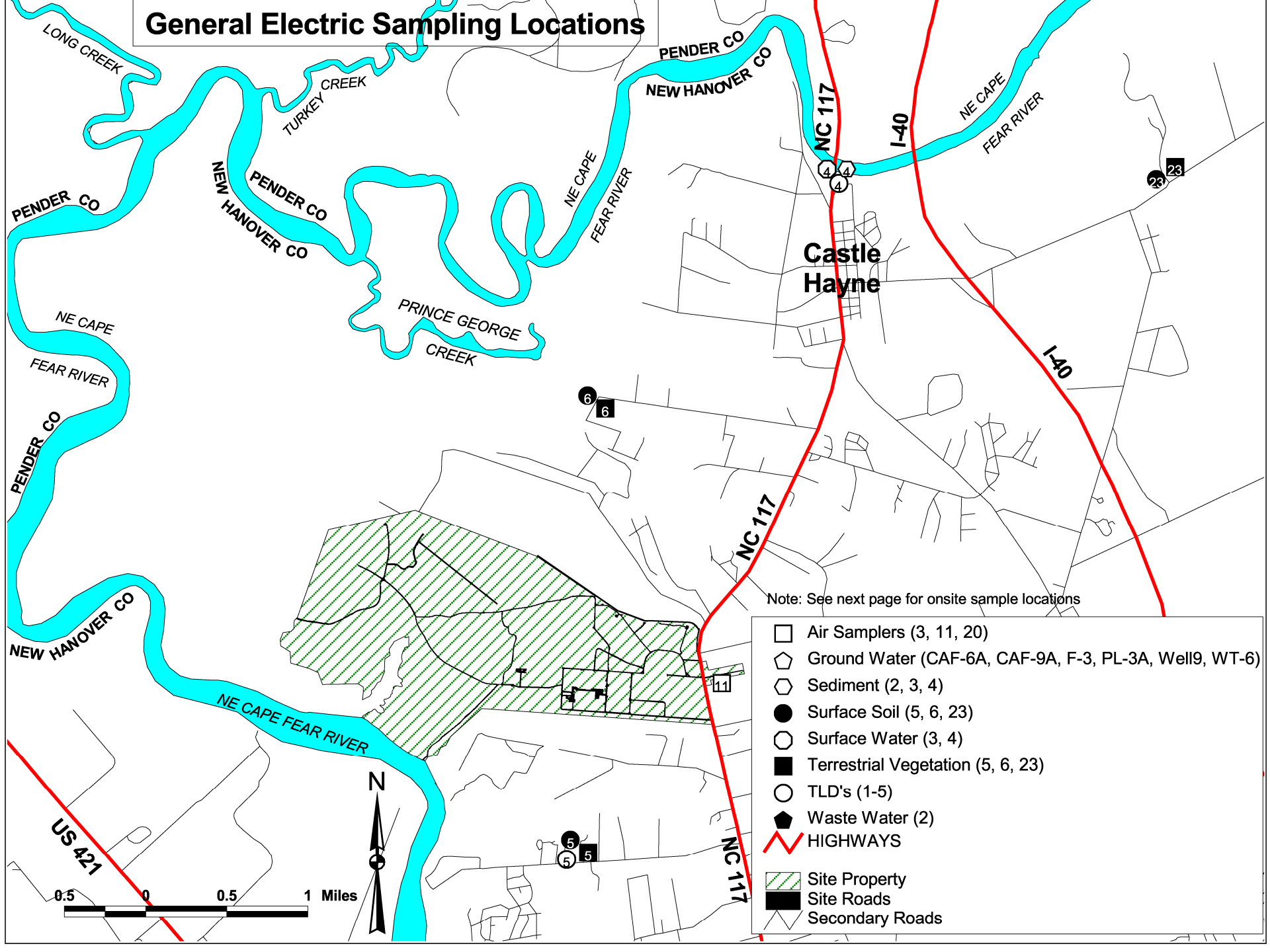
Total number of samples scheduled to be collected by sample media in 2003



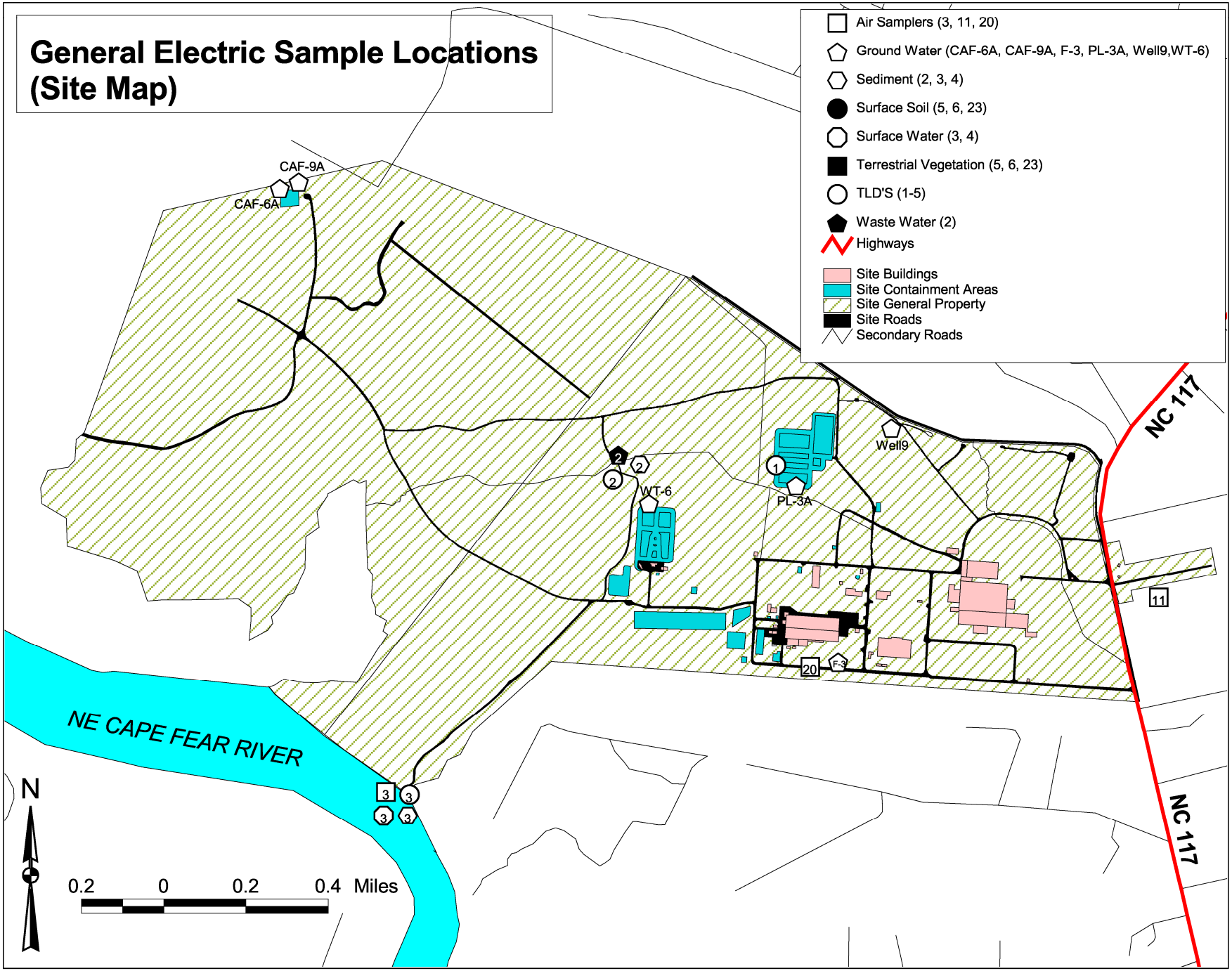
Major Facilities: An Overview

- Factors to consider when planning an environmental monitoring program:
  - Time - Pre-op, operational, and post-op.
  - Pathway - Which media could expose people?
  - Location - Which locations give a best dose model?
- Monitoring at major facilities conducted in parallel with utility environmental programs - “split-sampling”.

General Electric Sampling Locations



General Electric Sample Locations (Site Map)

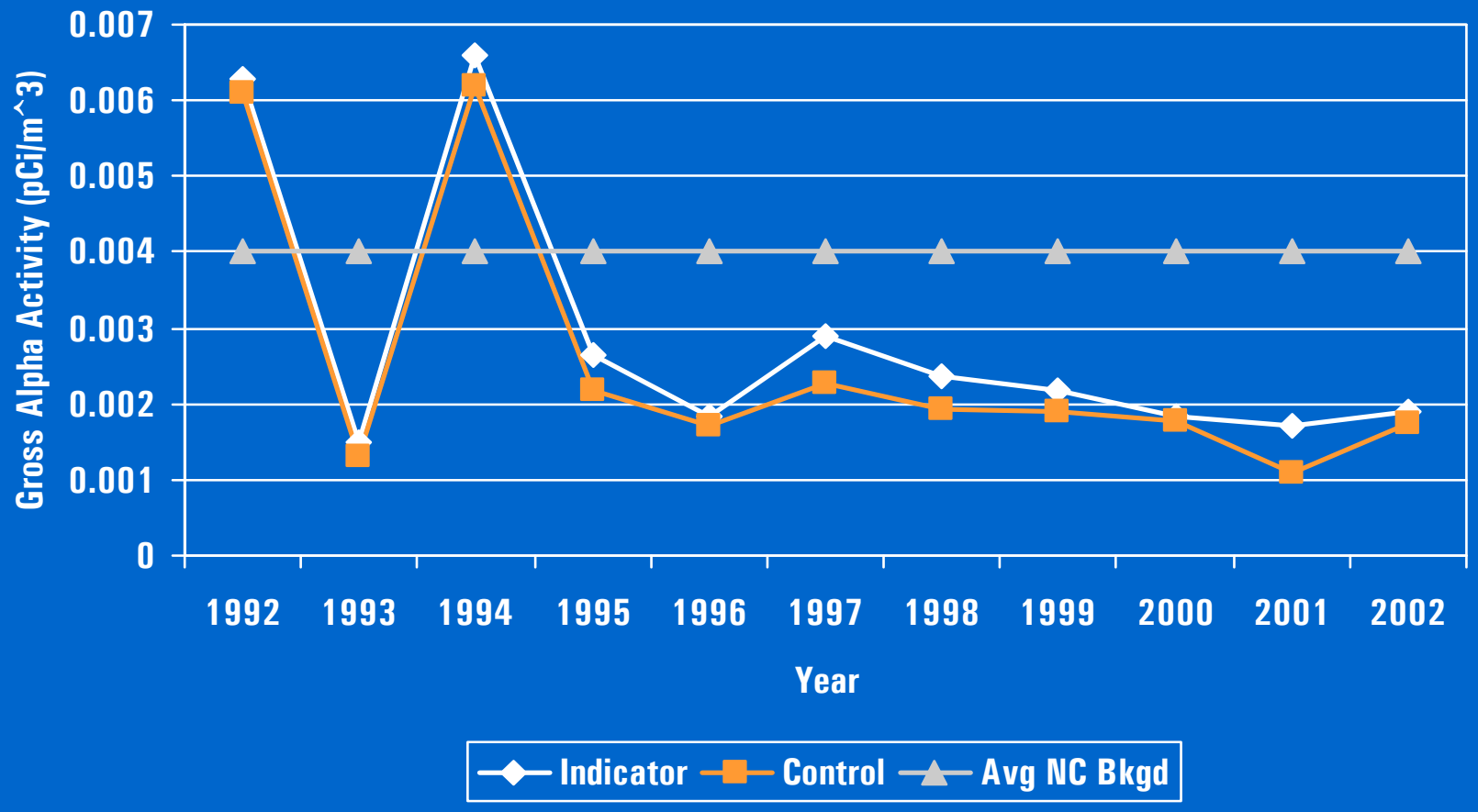


Global Nuclear Fuels: Basic Facts

- Owned and operated as a joint venture by GE, Hitachi, and Toshiba. (GE is majority partner).
- A nuclear fuel fabrication facility for power reactors.
- Located in Castle Hayne, NC (6 miles N of Wilmington) as part of a joint venture called Global Nuclear Fuels.
- Licensed in January, 1969.

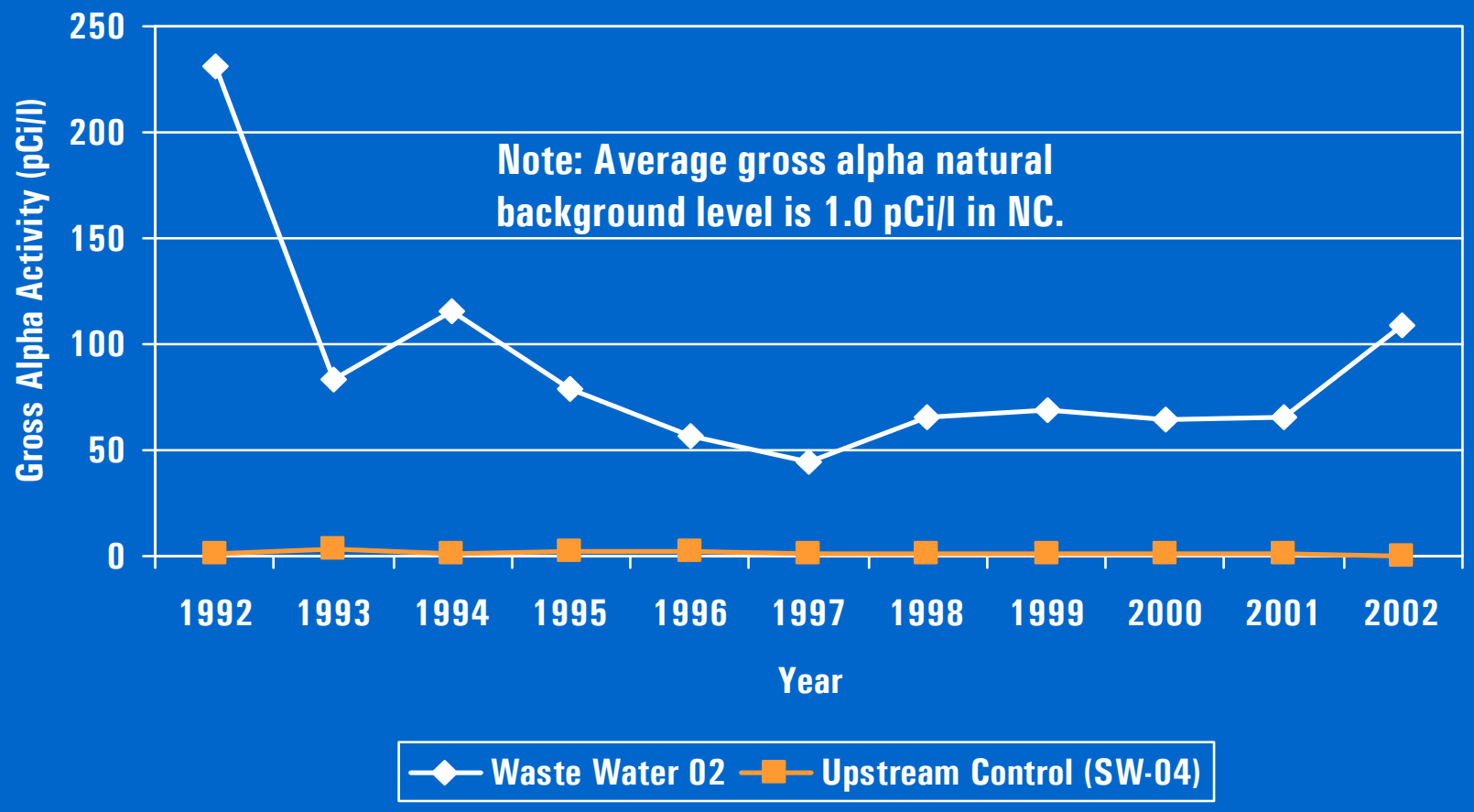
GNF Air Particulate

Gross Alpha Activity Averages, 1992 - 2002



GNF Surface Water

Gross Alpha Activity Averages, 1992 - 2002



Conclusion

- ERM fulfills the goals stated in the previous slide by:
  - Serving as an "early warning system" for potential radiation emergencies, both accidental and intentional.
  - Acting as a technical resource for other RPS programs, state agencies, licensees, and the general public.
  - Assuring public confidence in both facility and government by confirming the results of facility off-site monitoring programs.
  - Providing a holistic approach to radiation monitoring in NC. This core philosophy is not shared by any other rad monitoring program, public or private, in NC.