Florida Department of
Environmental Protection

Memorandum

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Clair

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APR 18 1995
Bureau of
Air Regulation

TO: Clair Fancy

FROM: Buck Oven BO

DATE: April 17, 1995

SUBJECT: Seminole Power Plant, Petcoke Test Burn
Pa 78-10, Module 8020

Please have the appropriate staff review the attached request for permission to conduct a test burn of Petroleum coke. Your staff may respond directly to Seminole Electric Coop with a copy to me.

SEMINOLE ELECTRIC COOPERATIVE INCORPORATED

April 12, 1995

Mr. Hamilton S. Oven
Florida Department of Environmental Protection
3900 Commonwealth Boulevard
Mail Station 48
Tallahassee, FL 32399-3000

RE: REQUEST TO PERFORM PETROLEUM COKE TEST BURN
SEMINOLE POWER PLANT - PUTNAM COUNTY
SITE CERTIFICATION No. PA 78-10

Dear Mr. Oven:

Seminole Electric Cooperative, Inc. (SECI) is currently investigating the feasibility of using petroleum coke as a supplemental fuel for Seminole Units 1 & 2. These units are currently permitted under the above-referenced site certification and Prevention of Significant Deterioration permit No. PSD-FL-018. SECI is requesting an amendment to these permits to allow a test burn of petroleum coke in one of the units.

SECI is proposing to test burn green delayed petroleum coke in Unit 1 at the Palatka plant. Petroleum coke is a by-product of the oil refining process. As crude oil is refined , the lighter products such as gas, gasolines, and gas oils are driven off, leaving a low valued residual oil.

Delayed coking is a batch process. Pre-heated residual oil is charged into a large coking drum and subjected to heat and pressure for a period of 18-24 hours. Thus the term "delayed" coke. During this coking period, lighter volatiles are removed from the top of the coker drum, and the carbonaceous remainder solidifies into petroleum coke. Following a brief cooling period, the top and bottom of the coker are removed and the coke is drilled out with a high pressure drill.

The chemical quality of petroleum coke is determined, primarily, by the specification of the refiner's inbound crude oil. In general, petroleum coke is a high BTU, low ash, low volatile, and mid-high sulfur fuel.

There are two types of delayed petroleum coke: sponge coke and shot coke. The names are derived from the physical appearance of each product. Sponge coke is porous and the softer of the two coke types. Shot coke consists of small bonded spheres and resembles agglomerated BB's. SECI is proposing to use sponge coke in its test burn.

While coke quality can vary significantly from refinery to refinery, within each refinery, product specifications remain very constant. The typical "as-received" specifications for the product that will be used during the test burn are shown below.

Moisture (percent)	9.0
Volatiles (percent)	11.0 - 14.0
Ash (percent)	0.35 - 1.00
Sulfur (percent)	5.00 - 5.50
Heat content (Btu/lb)	14,000
Vanadium (ppm)	800 - 1500
Silicon (ppm)	300
Iron (ppm)	300

A complete set of typical proximate and ultimate analysis results for sponge petroleum coke is presented in Attachment A. Mineral ash and sieve analysis may be found in Attachment B.

The physical properties and bulk handling characteristics of delayed petroleum coke are very similar to coal. Cutting coke from the drums via hydrostatic pressure results in multi-sized product and most cokes are further processed via crushing or screening operations.

Fly ash and bottom ash produced during the test burn will be handled and disposed of in accordance with current plant practices. One hundred percent of the bottom ash is sold for use in the aggregate industry. Approximately 80% of the fly ash is incorporated into the FGD sludge fixation process. The fly ash is combined with dewatered unoxidized FGD sludge and lime in a pozzolanic process. These constituents immediately react upon mixing in an irreversible hardening process (pozzolanic process) to form a product with properties similar to those of portland cement. The pozzolanic process continues indefinitely and chemically binds soluble constituents in the mixture into insoluble compounds. The remaining 20% is sold for use in the aggregate industry.

For the test burn, SECI proposes to blend up to 20% petroleum coke for a period not to exceed 30 days. At a total solid fuel consumption rate of 5,000 tons per day, a total of 30,000 tons of petroleum coke will be consumed during the test burn period (i.e. 1,000 tons of petroleum coke per day).

ATTACHMENT A

Sponge Petroleum Coke

Proximate analysis

	As Rec 'd	Dry Basis
Total Moisture	8.69%	XXXXX
Ash	0.26%	0.28%
Volatile Matter	11.32%	12.40%
Fixed Carbon	79.73%	87.32%
Sulfur	4.65%	5.09%
Btu/Lb	14,1641	5,152
SO2 Lb/MM Btu @ 100%	6.57%	
Alk. As Sodium Oxide	0.01%	0.01%

Ultimate Analysis

	s Rec'd	Dry Basis
Total Moisture	8.69%	XXXXX
Ash	0.26%	0.28%
Hydrogen	3.84%	4.20%
Nitrogen	1.48%	1.62%
Fixed Carbon	80.97%	88.68%
Sulfur	4.65%	5.09%
Oxygen (Diff)	0.11%	0.13%

Hardgrove Grindability Index – 82

Fusion Temperature of Ash (Farenheit)

	Reducing	Oxidizing
Initial Deformation	2350	2065
Softening	2385	2085
Hemispherical	2405	2095
Fluid	2425	2125

ATTACHMENT B

Sponge Petroleum Coke

Mineral Ash

Mineral Analysis	Weight % Ignited Basis
Silicon Oxide	10.30%
Aluminum Oxide	2.24%
Titanium Dioxide	1.40%
Iron Oxide	6.28%
Calcium Oxide	10.04%
Magnesium Oxide	1.98%
Potassium Oxide	1.04%
Sodium Oxide	3.96%
Sulfur Trioxide	24.01%
Phosphorous Pentoxide	0.30%
Strontium Oxide	0.06%
Manganese Oxide	0.11%
Nickel Oxide	5.33%
Vanadium Pentoxide	31.25%
Undetermined	1.70%

Sieve Analysis

Passing	Retained	Weight	Cumulative Results: Retained	Cumulative Results: Passing
XXXXX	4" Sq.	0.00%	0.00%	100.00%
4" Sq.	3" Sq.	3.63%	3.63%	69.37%
3" Sq	2" Sq.	4.44%	8.07%	91.93%
2" Sq.	1 1/4" Sq.	4.44%	12.51%	87.49%
3/4" Sq.	3/4" Sq.	3.63%	18.96%	81.04%
1/2" Sq.	1/4" Sq.	10.08%	33.88%	66.12%
1/4" Sq.	0	66.12%	100.00%	0.00%