



Nuclear Consulting
Services, Inc.

P.O. BOX 29151 - COLUMBUS, OHIO 43229

Carbon Sample Test Report

performed for

Cleveland Electric Illuminating Co.
Perry Nuclear Plant

P.O. R-5293-65

15 July 1986

DISTRIBUTION

Perry: (2) Dave Reyes

NUCON: (1) Master File
(1) Lab
(1) J. C. Enneking

8607310324 860729
PDR ADDCK 05000440
S PDR



NUCLEAR CONSULTING SERVICES, INC. Date 30 June 86

P.O. Box 29151 Columbus, Ohio 43229

Project 06C0869

CARBON SAMPLE TESTING Requested By WPF

CLIENT: C.E.I. - Perry Nuclear Power Plant

Description 14A N64-D0014A

Disposition:

Order No. _____

Discard _____

Sample No. 786-1A 30 June 86

Retain 6 mos. _____

Lot No. _____

12 mos. _____

Batch No. _____

Indefinitely X

TEST	NO.	AS IS	150°C DRIED	HIGH TEMP. REACT.
A.D. q/ml	ASTM D2854		X 0.57	
CC14 wt %	ASTM D3467			
RET. wt %				
P. S. minutes				
SURFACE AREA m ² /g				
I ₂ NO.				
PORE VOL. MICRO ml/g				
PORE VOL. MACRO ml/g	Aminco			
H ₂ O wt %	ASTM D2867	X 0.8		
ASH wt %	ASTM D2866		X 1.6	
HARDNESS %	ASTM D3802	X 95.4		
VOLATILE wt %	PROC 121			X 1.1
pH	ASTM D3838			
IGNITION °C	ASTM D3466	X 405	* 153	
CARBONATE SOL. ppm				
CHLORIDE Total ppm				
CHLORIDE SOL. ppm				
NITRATE SOL. ppm				
AV. PARTICLE SIZE	Fisher			
K-Kr	cc/g PROC 30		X 53	
K-Xe	cc/g PROC 30		X 1090	

PARTICLE SIZE DIST. ASTM D2062

MESH SIZE	Wgt. %	Cum. %	OPENING	Wgt. %	Cum. %	REMARKS
On 6	0					
On 8	1.4					
On 12	39.8					
On 16	55.4					
On 20	3.1					Date <u>15 Jul 86</u>
Thru 20	0.3		Thru			Tested by <u>J. Katz</u>
Total			Total			Certified by <u>W.B. Brown</u>

*@ 4 fpm "as is"

Dynamic K factors are average at 3 determinations



NUCLEAR CONSULTING SERVICES, INC. Date 30 June 1986

P. O. Box 29151 Columbus, Ohio 43229

Project 06C0869

CARBON SAMPLE TESTING Requested By WPF

CLIENT: C.E.I. - Perry Nuclear

Description N64-D0014B

Disposition:

Order No. _____

Discard _____

Sample No. 786-1B 30 June 86

Retain 6 mos. _____

Lot No. _____

12 mos. _____

Batch No. _____

Indefinitely X

TEST	NO.	AS IS	150°C DRIED	HIGH TEMP. REACT.
A.D. g/ml	ASTM D2854		X 0.55	
CC14 wt %	ASTM D3467			
RET. wt %				
P. S. minutes				
SURFACE AREA m ² /g				
I2 NO.				
PORE VOL. MICRO ml/g				
PORE VOL. MACRO ml/g	Aminoc			
H2O wt %	ASTM D2867	X 0.6		
ASH wt %	ASTM D2866		X 1.8	
HARDNESS %	ASTM D3802	X 95.3		
VOLATILE wt %	PROC 121			X 1.8
pH	ASTM D3838			
IGNITION °C	ASTM D3466	X 390	* 220	
CARBONATE SOL. ppm				
CHLORIDE Total ppm				
CHLORIDE SOL. ppm				
NITRATE SOL. ppm				
AV. PARTICLE SIZE	Fisher			
K-Kr cc/g	PROC 30		X 53	
K-Xe cc/g	PROC 30		X 1050	

PARTICLE SIZE DIST. ASTM D2862

MESH SIZE	Wgt. %	Cum. %	OPENING	Wgt. %	Cum. %	REMARKS
On 6	0					
On 8	3.3					
On 12	35.9					
On 16	55.8					
On 20	4.6					Date <u>15 JUL 86</u>
Thru 20	0.4		Thru			Tested by <u>J. Kuty</u>
Total			Total			Certified by <u>W. R. [Signature]</u>

*@ 4 fpm "as is"



NUCLEAR CONSULTING SERVICES, INC. Date 3 July 86

P. O. Box 27151 Columbus, Ohio 43227

Project 06C0869

CARBON SAMPLE TESTING Requested By WPF

CLIENT: C.E.I. - Perry Nuclear Plant

Description BC Lot 1605

Disposition:

Order No. _____

Discard _____

Sample No. 786-2A 3 Jul 86

Retain 6 mos. _____

Lot No. _____

12 mos. _____

Batch No. _____

Indefinitely X

TEST	NO.	AS IS	150°C DRIED	HIGH TEMP. REACT.
A.D. g/ml	ASTM D2854		X 0.58	
CC1g wt %	ASTM D3467			
RET. wt %				
P. S. minutes				
SURFACE AREA m ² /g				
I2 NO.				
PURE VOL. MICRO ml/g				
PURE VOL. MACRO ml/g	Aminco			
H2O wt %	ASTM D2867	X 1.8		
ASH wt %	ASTM D2866		X 1.5	
HARDNESS %	ASTM D3802	X 92.6		
VOLATILE wt %	PROC 121			X 1.7
pH	ASTM D3838			
IGNITION °C	ASTM D3466	X 385	* 315	
CARBONATE SOL. ppm				
CHLORIDE Total ppm				
CHLORIDE SOL. ppm				
NITRATE SOL. ppm				
AV. PARTICLE SIZE	Fisher			
K-Kr cc/g	PROC 30		X 54	
K-Xe cc/g	PROC 30		X 1120	

PARTICLE SIZE DIST. ASTM D2862

MESH SIZE	Wgt. %	Cum. %	OPENING	Wgt. %	Cum. %	REMARKS
Dn 6	0					
Dn 8	0.4					
Dn 12	50.9					
Dn 16	46.4					
Dn 20	2.1					Date 15 Jul 86
Thru 20	0.2		Thru			Tested by J. Kuty
Total			Total			Certified by <i>W. G. ...</i>



NUCLEAR CONSULTING SERVICES, INC. Date 3 July 86

P. O. Box 29151 Columbus, Ohio 43229

Project 06C0869

CARBON SAMPLE TESTING Requested By WPF

CLIENT: C.E.L. - Perry Nuclear Plant

Description Lot 1605 BC

Disposition:

Order No. _____

Discard _____

Sample No. 786-2B 3 July 86

Retain 6 mos. _____

Lot No. _____

12 mos. _____

Batch No. _____

Indefinitely X

TEST	NO.	AS IS	150°C DRIED	HIGH TEMP. REACT.
A.D. g/ml	ASTM D2854		X 0.59	
CCl ₄ wt %	ASTM D3467			
RET. wt %				
P. S. minutes				
SURFACE AREA m ² /g				
I ₂ NO.				
PORE VOL. MICRO ml/g				
PORE VOL. MACRO ml/g	Aminon			
H ₂ O wt %	ASTM D2867	X 2.0		
ASH wt %	ASTM D2866		X 1.6	
HARDNESS %	ASTM D3802	X 91.8		
VOLATILE wt %	PROC 121			X 3.9
pH	ASTM U3838			
IGNITION °C	ASTM D3466	X 395	* 215	
CARBONATE SOL. ppm				
CHLORIDE Total ppm				
CHLORIDE SOL. ppm				
NITRATE SOL. ppm				
AV. PARTICLE SIZE	Fisher			
K-Kr cc/g	PROC 30		X 54	
K-Xe cc/g	PROC 30		X 1100	

PARTICLE SIZE DIST. ASTM D2862

MESH SIZE	Wgt. %	Cum. %	OPENING	Wgt. %	Cum. %	REMARKS
On 6	0.1					
On 8	0.1					
On 12	41.1					
On 16	54.7					
On 20	3.8					Date <u>15 Jul 86</u>
Thru 20	0.2		Thru			Tested by <u>J. K. ...</u>
Total			Total			Certified by <u>W. P. ...</u>

*@ 4 fpm "as is"

Dynamic K factors are average at 3 determinations



NUCLEAR CONSULTING SERVICES, INC. Date 3 July 86

P.O. Box 29151 Columbus, Ohio 43229

Project 06C0869

CARBON SAMPLE TESTING Requested By WPF

CLIENT: C.E.I. - Perry Nuclear

Description BC Lot 1605

Disposition:

Order No. _____

Discard _____

Sample No. 786-2C 3 July 86

Retain 6 mos. _____

Lot No. _____

12 mos. _____

Batch No. _____

Indefinitely X

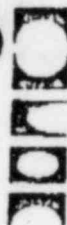
TEST	NO.	AS IS	150°C DRIED	HIGH TEMP. REACT.
A.D. g/ml	ASTM D2054		X 0.59	
CCl4 wt %	ASTM D3467			
RET. wt %				
P. S. minutes				
SURFACE AREA m ² /g				
I2 NO.				
PORE VOL. MICRO ml/g				
PORE VOL. MACRO ml/g	Aminco			
H2O wt %	ASTM D2867	X 1.9		
ASH wt %	ASTM D2866		X 1.9	
HARDNESS %	ASTM D3802	X 91.9		
VOLATILE wt %	PROC 121			X 2.3
pH	ASTM D3838			
IGNITION °C	ASTM D3466	X 370	X 280	
CARBONATE SOL. ppm				
CHLORIDE Total ppm				
CHLORIDE SOL. ppm				
NITRATE SOL. ppm				
AV. PARTICLE SIZE	Fisher			
K-Kr cc/g	PROC 30		X 54	
K-Xe cc/g	PROC 30		X 1080	

PARTICLE SIZE DIST. ASTM D2862

MESH SIZE	Wgt. %	Cum.	OPENING	Wgt. %	Cum.	REMARKS
On 6	0					
On 8	0.2					
On 12	43.7					
On 16	52.0					
On 20	3.2					Date <u>15 Jul 86</u>
Thru 20	0.9		Thru			Tested by <u>J Kady</u>
Total			Total			Certified by <u>WPF</u>

* 4fpm "as is"

Dynamic K factors are average at 3 determinations



NUCLEAR CONSULTING SERVICES, INC. Date 6 July 86

P. O. Box 29151 Columbus, Ohio 43229

Project 06C0869

CARBON SAMPLE TESTING Requested By WPF

CLIENT: C.E.I. - Perry Nuclear

Description N64 D0012B (Bottom)

Disposition:

Order No. _____

Discard _____

Sample No. 786-3A 6 July 86

Retain 6 mos. _____

Lot No. _____

12 mos. _____

Batch No. _____

Indefinitely X

TEST	NO.	AS IS	150°C DRIED	HIGH TEMP. REACT.
A.D. g/ml	ASTM D2054		X 0.58	
CCl ₄ wt %	ASTM D3467			
RET. wt %				
P. S. minutes				
SURFACE AREA m ² /g				
I ₂ NO.				
PORE VOL. MICRO ml/g				
PORE VOL. MACRO ml/g	Aminoc			
H ₂ O wt %	ASTM D2867	X 0.6		
ASH wt %	ASTM D2866		X 1.7	
HARDNESS %	ASTM D3802	X 93.5		
VOLATILE wt %	PROC 121			X 3.0
pH	ASTM D3838			
IGNITION °C	ASTM D3466	X 370	* 300	
CARBONATE SOL. ppm				
CHLORIDE Total ppm				
CHLORIDE SOL. ppm				
NITRATE SOL. ppm				
AV. PARTICLE SIZE	Fisher			
K-Kr cc/g	PROC 30		X 54	
K-Xe cc/g	PROC 30		X 1075	

PARTICLE SIZE DIST. ASTM D2862

MESH SIZE	Wgt. %	Cum. %	OPENING	Wgt. %	Cum. %	REMARKS
On 6	0					
On 8	2.1					
On 12	43.8					
On 16	51.9					
On 20	2.1					Date <u>15 JUL 86</u>
Thru 20	0.1		Thru			Tested by <u>J. Kutz</u>
Total			Total			Certified by <u>W.P.F.</u>

*4 fpm "as is"



NUCLEAR CONSULTING SERVICES, INC. Date 6 July 86

P. O. Box 29151 Columbus, Ohio 43229

Project 06C0869

CARBON SAMPLE TESTING

Requested By WPF

CLIENT: C.E.I. - Perry Nuclear Power Plant

Description N64-D0014B (Bottom)

Disposition:

Order No. _____

Discard _____

Sample No. 786-3B 6 July 86

Retain 6 mos. _____

Lot No. _____

12 mos. _____

Batch No. _____

Indefinitely X

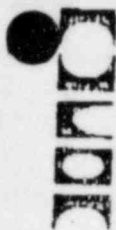
TEST	NO.	AS IS	150°C DRIED	HIGH TEMP. REACT.
A.D. g/ml	ASTM D2054		X 0.57	
CCl ₄ wt %	ASTM D3467			
RET. wt %				
P. S. minutes				
SURFACE AREA m ² /g				
I ₂ NO.				
PORE VOL. MICRO ml/g				
PORE VOL. MACRO ml/g	Amined			
H ₂ O wt %	ASTM D2867	X 0.6		
ASH wt %	ASTM D2066		X 1.5	
HARDNESS %	ASTM D3802	X 86.1		
VOLATILE wt %	PROC 121			X 1.9
pH	ASTM D3838			
IGNITION °C	ASTM D3466	X 370	X 280	
CARBONATE SOL. ppm				
CHLORIDE Total ppm				
CHLORIDE SOL. ppm				
NITRATE SOL. ppm				
AV. PARTICLE SIZE	Fisher			
K-Kr cc/g	PROC 30		X 57	
K-Xe	PROC 30		X 1150	

PARTICLE SIZE DIST. ASTM D2862

MESH SIZE	Wgt. %	Cum.	OPENING	Wgt. %	Cum.	REMARKS
On 6	0					
On 8	4.9					
On 12	44.2					
On 16	50.4					
On 20	0.3					Date 15 Jul 86
Thru 20	0.2		Thru			Tested by JK
Total			Total			Certified by <i>[Signature]</i>

*4 fpm "as is"

Dynamic K factors are average at 3 determinations



NUCLEAR CONSULTING SERVICES, INC. Date 6 July 86

P. O. Box 29151 Columbus, Ohio 43229

Project 06C0869

CARBON SAMPLE TESTING

Requested By WPF

CLIENT: C.E.I. - Perry Nuclear Plant

Description N64-D0012A (Bottom)

Disposition:

Order No. _____

Discard _____

Sample No. 786-3C 6 July 86

Retain 6 mos. _____

Lot No. _____

12 mos. _____

Batch No. _____

Indefinitely X

TEST	NO.	AS IS	150°C DRIED	HIGH TEMP. REACT.
A.D. g/ml	ASTM D2854		X 0.56	
CC14 wt %	ASTM D3467			
RET. wt %				
P. S. minutes				
SURFACE AREA m ² /g				
I ₂ NO.				
PORE VOL. MICRO ml/g				
PORE VOL. MACRO ml/g	Amicon			
H ₂ O wt %	ASTM D2867	X 0.6		
ASH wt %	ASTM D2866		X 1.7	
HARDNESS %	ASTM D3802	X 86.1		
VOLATILE wt %	PROC 121			X 1.9
pH	ASTM D3838			
IGNITION °C	ASTM D3466	X 415	* 280	
CARBONATE SOL. ppm				
CHLORIDE Total ppm				
CHLORIDE SOL. ppm				
NITRATE SOL. ppm				
AV. PARTICLE SIZE	Fisher			
K-Kr cc/g	PROC 30		X 57	
K-Xe cc/g	PROC 30		X 1150	

PARTICLE SIZE DIST. ASTM D2862

MESH SIZE	Wgt. %	Cum.	OPENING	Wgt. %	Cum.	REMARKS
On 6	0					
On 8	2.0					
On 12	34.4					
On 16	59.6					
On 20	3.7					Date <u>15 Jul 86</u>
Thru 20	0.3		Thru			Tested by <u>J.K.T.</u>
Total			Total			Certified by <u>W.P.F.</u>

*4 fpm "as is"
Dynamic K factors are average at 3 determinations

ATTACHMENT 5

Carbon Sample Test Report

of the Replacement Carbon Supplied by NUCON