APPENDIX A BOF WASTE TREATABILITY STUDY

BOF Sludge Treatability Study

(01.04.10)

Prepared for :

Severstal Sparrows Point

Prepared by:

Sevenson
Environmental
Services, Inc.

Purpose:

The purpose of the treatability study is to better define the characteristics of the BOF sludge and to find an additive blend that can produce a material that could potentially be used as road base at Greys Landfill or to be used as structural fill on the plant property.

Base Material:

Sevenson sampled the BOF sludge on two separate occasions. The first sampling event took place in July of 2009. Material was obtained from the sludge stockpile located at the BOF waste treatment plant at the Severstal plant in Sparrows Point, MD. The second set of samples were obtained in December from the end of the belt filter press in the BOF treatment building.

The initial sample was delivered to Sevenson's Waste Stream Technology, Inc. (WST) analytical laboratory, located in Buffalo, NY and was tested for Specific Gravity, pH, percent solids and moisture content. The second sample was delivered to Geo-Technology Associates, Inc.'s (GTA) laboratory, located in New Castle, DE and was tested for grain size, moisture content and plastic and liquid limits.

The material, as received, is a moist, brown in color, clay like material with a slight odor. The sludge is composed of about 10-percent sand-size particles, 87-percent silt-size particles and 3-percent clay-size particles on a dry weight basis with a pH of 11. The liquid limit was approximately 21-percent and the plastic limit 17-percent. The sludge exhibits thixotropic characteristics. The more the sludge is worked the more fluid the sludge becomes. When the sludge is left alone it reverts back to a semi-solid material. Moisture contents varied greatly on the two samples. The July sample had a moisture content of 37-percent while the December moisture content was about 50-percent.

Ad-mixture Selection:

Type I/II Portland Cement was selected as the ad-mixture reagent for this study. Portland cement was used in Severstal's previous in-house stabilization testing. It was decided to perform this round of testing with Portland cement also in order to compare the results of both rounds of testing. Type I/II Portland cement was procured from the LaFarge cement terminal adjacent to the Key Bridge in Baltimore, MD.

Phase I Testing:

WST Treatability Test Matrix:

The matrix derived for this treatability study was based on developing a percent solids window from 66 to 72-pecent solids of the BOF sludge. The sludge was tested for percent solids and then adjusted to 66, 69 and 72-percent solids as needed. Ad-mixture rates for the reagent were 10, 15 and 20-percent added as a percentage of the final treated weight of the mixture for the selected percent solids. In addition, a slag mix was made that added 10-percent slag to a 72-percent solids and 10-percent portland cement mix.

Samples were tested for unconfined compressive strength (UCS) by pocket penetrometer after 4-hours of curing and were also tested for UCS, moisture content, and percent solids after 3, 7 and 28-day cures.

WST Sample Preparation, Mixing and Testing:

Samples were prepared and mixed in WST's lab on October 19, 2009. The Severstal sludge samples were altered to create three batches of 66, 69 and 72-percent solids material. 2,700 gram sludge samples were mixed with 300, 450 and 600 grams of portland cement to make the 10, 15 and 20-percent portland cement mixes. Portland cement and sludge were blended together using trowels until the portland was no longer visible. Sludge went from semi-solid to more plastic type material. Mix was then placed into 2-inch by 4-inch molds and cured for the appropriate number of days.

Prior to cylinder breaks, cylinders were weighed to determine the percent weight change from the curing day to the day the samples were prepared. Breaks were then performed on 3, 7 and 28-days intervals. After the samples were tested for UCS (ASTM D-2166), the remains of the cured sample was tested for moisture content (ASTM D-2216) and percent solids (SM-2450G).

WST Test Results:

UCS/% Solids/Moisture Content:

			4 Hour	3 Day Cure			7 Day Cure			28 Day Cure		
Sample ID	Initial % Solids	%PC*	UCS by pocket penetrometer (psi)	% Solids	Moisture Content	UCS (psi)	% Solids	Moisture Content	UCS (psi)	% Solids	Moisture Content	UCS (psi)
BOF Filtercake	66	10% (300g)	14.22	76.34	30.99	51	75.46	32.51	76	81.85	22.17	106
		15% (450g)	16.36	78.41	27.53	305	79.00	26.58	333	85.74	16.63	394
		20% (600g)	21.33	80.17	24.74	310	80.81	23.75	401	86.22	15.98	350
	69	10% (300g)	10.67	77.43	29.15	102	77.42	29.17	106	82.53	21.16	108
		15% (450g)	16.00	78.60	27.23	239	80.31	24.51	343	81.55	22.63	545
		20% (600g)	28.45	80.91	23.59	374	82.06	21.87	569	83.83	19.29	611**
	72	10% (300g)	12.45	78.16	27.94	57	79.74	25.41	178	85.72	16.67	248
		15% (450g)	24.89	81.08	23.34	252	81.38	22.88	330	85.51	16.94	614**
		20% (600g)	37.34	80.58	20.78	329	82.57	21.11	621	88.00	13.64	479
Slag Mix	72	10% (300g)	--	80.62	24.04	167	76.21	31.21	295	--	--	--

*Amount of reagent added is percentage of the final treated weight (3000g).

Slag Mix refers to the BOF Filtercake sample mixed with 10% slag.

**Test was stop as the maximum load dial reading of 1000 was reached.

The testing results show the influence of the percent solids of the sludge in resultant strength. The higher the percent solids the higher the UCS result. As expected, the increase in cement addition results in higher UCS results.

One of the goals of the study was to determine a mix that will provide a structural material that can be utilized for such things as road base. A common "target strength" for road base soil mixing material is to have UCS results in the 200 to 300 psi range at a 7-day cure. The above results show that the 15-percent portland cement ad-mixes for all of the solids contents tested performed up to this standard. In addition the "Slag Mix" with 10-percent portland cement and 10-percent slag also reached this goal.

WST Weight Change:

Cylinder Cured Weight

Mix I.D.	Cylinder Wet Wt.	3 Day (g)	% Wt. Change (from Wet	7 Day (g)	% Wt. Change (from Wet Wt.)	28 Day (g)	% Wt. Change
66%-10%PC	458.5	449.8	-1.9	444.4	-3.1	414.0	-9.7
66%-15%PC	462.5	470.3	1.7	452.4	-2.2	415.7	-10.1
66%-20%PC	477.8	470.3	-1.6	462.6	-3.2	438.9	-8.1
69%-10%PC	472.2	467.0	-1.1	463.2	-1.9	439.0	-7.0
69%-15%PC	464.5	462.7	-0.4	460.1	-0.9	452.6	-2.6
69%-20%PC	486.7	484.1	-0.5	474.3	-2.5	451.8	-7.2
72%-10%PC	467.4	466.2	-0.3	464.7	-0.6	430.8	-7.8
72%-15%PC	483.5	481.0	-0.5	476.9	-1.4	462.6	-4.3
72%-20%PC	498.9	496.9	-0.4	491.6	-1.5	475.2	-4.8

All of the test mixes demonstrate the loss of weight over time. This is a result of the water being consumed by the hydration process.

Phase II Testing:

The UCS results of the WST testing for the 15-percent addition of portland cement gave results that were acceptable but were on the higher end of the targeted range. Sevenson obtained

additional sample (December sampling event) to try and reduce the amount of portland required while still achieving acceptable UCS results in hopes of lowering the cost of additive needed. The sample that was received, as stated earlier, had a moisture content of 50-percent which was considerably higher than the initial sample in July. Since this may be representative of material to be processed, test specimens were made on the "as received" material. Cement addition used in the WST study was added to the 50-percent moisture sludge sample. This resulted in samples not setting in 3-days and very low compressive strengths (26-psi) in 7-day cures.

In lieu of adding more cement to the sample, in turn making a more expensive mix, the sample was air dried to moisture contents of 33 and 25-percent. In field applications, Sevenson recommends using lime kiln dust (LKD) or cement kiln dust (CKD) to reduce the moisture content prior to the addition of the portland cement.

GTA prepared samples and performed compressive strength testing on 2-inch by 2-inch specimens. The general properties after mixing and the compressive strength results are summarized in the table below.

GTA Test Results:

Initial Moisture Content (%)	Cement Content Wet Weight Basis (%)	Observations	3-day Compressive Strength (psi)	7-day Compressive Strength (psi)
50	10	Wet of liquid limit, Excessive shrinkage and cracking.	Not set	26
33	11	Near liquid limit, significant Shrinkage and cracking	53*	88
25	12	Dry of plastic limit, near Optimum moisture content for compaction, negligible Shrinkage, no cracking.	104	147

* 4-day result

A one-point approximation of the maximum dry density and optimum moisture content of the cement/sludge mix was performed and indicated that the maximum dry density will generally range from 130 to 135 pounds per cubic foot (pcf) with an optimum moisture content ranging from 20 to 22 percent based on ASTM D558 (Standard Proctor).

Conclusions and Recommendations:

Based on both the WST and GTA testing, adding between 12 and 15-percent portland cement to the BOF sludge should provide a suitable material for road base or structural fill. The moisture content and percent solids of the BOF sludge have a great influence on the final end product and will have to be calculated and possibly adjusted prior to adding the portland cement. The 10-percent slag mix is also acceptable as a road base or structural fill blend.

Sevenson recommends conducting a field demonstration to verify ad-mixture percentages and material placement techniques. Depending on the sub-base, single or multiple 9 to 12-inch layers should be placed and tested for heavy construction vehicle travel. Wearing courses of 8 to 12-inches of slag may be necessary to keep the treated sludge layer from cracking or dusting in this application.

Waste Stream Technology, Inc

Raw Data

Severstal Steel

Rec'd 7/17/09

Initial Data

Sample ID	SG	pH	% Solids	Moisture Content	Physical Description
BOF Filtercake	2.24	11.12	72.88	37.21	Moist, brown, clay like material. Slight garbage odor.

Unconfined Compressive Strength Test

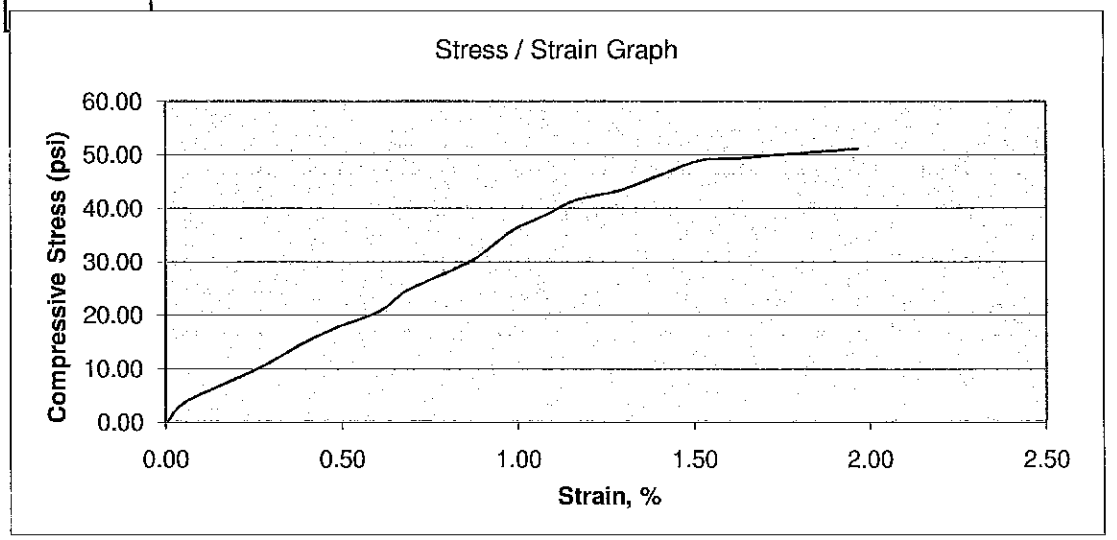
Client: Severstal Steel
Sample I.D.: 66%-10% PC
Cure Period: Day 3

Date:10/22/09
Proving Ring No.: 26266
Technician: TY / NAO'S

	Millimeters	Inches
Cylinder Height:	100.9	3.97
Cylinder Diameter:	51.6	2.03
Cylinder Radius:	25.8	1.02

Strain Rate: 1 %/min

Load - Dial Reading	Load (lbf)	Compressive Stress (psi)	Average Cross-sectional Area (in^2)	Deformation Dial Reading	Axial Strain (in.)	Axial Strain, %
0	0.00	0.00	3.24	0	0	0.00
3	12.06	3.72	3.24	0.002	0.001	0.05
8	22.39	6.90	3.24	0.006	0.002	0.15
14	34.78	10.71	3.25	0.011	0.003	0.28
20	47.17	14.51	3.25	0.015	0.004	0.38
25	57.50	17.66	3.26	0.019	0.005	0.48
30	67.83	20.81	3.26	0.024	0.006	0.60
36	80.22	24.59	3.26	0.027	0.007	0.68
42	92.62	28.36	3.27	0.032	0.008	0.81
46	100.88	30.86	3.27	0.035	0.009	0.88
54	117.41	35.88	3.27	0.039	0.010	0.98
59	127.73	39.00	3.28	0.043	0.011	1.08
63	136.00	41.49	3.28	0.046	0.012	1.16
66	142.19	43.33	3.28	0.051	0.013	1.28
70	150.46	45.80	3.29	0.055	0.014	1.38
75	160.78	48.88	3.29	0.06	0.015	1.51
76	162.85	49.45	3.29	0.065	0.016	1.64
77	164.92	50.02	3.30	0.069	0.017	1.74
79	169.05	51.16	3.30	0.078	0.020	1.96



Maximum Load: 169.05 lbf
Total Strain: 1.96%
Unconfined Compressive Strength: 51 psi

Unconfined Compressive Strength Test

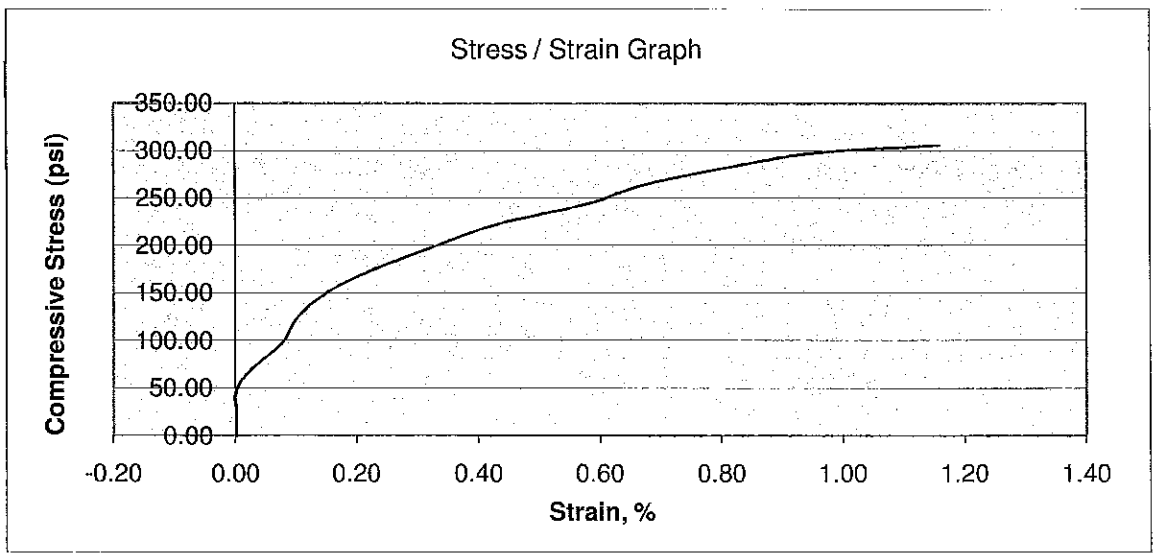
Client: Severstal Steel
Sample I.D.: 66%-15% PC
Cure Period: Day 3

Date:10/22/09
Proving Ring No.: 26266
Technician: TY / NAO'S

	Millimeters	Inches
Cylinder Height:	100.9	3.97
Cylinder Diameter:	51.5	2.03
Cylinder Radius:	25.75	1.01

Strain Rate: 1 %/min

Load - Dial Reading	Load (lbf)	Compressive Stress (psi)	Average Cross-sectional Area (in^2)	Deformation Dial Reading	Axial Strain (in.)	Axial Strain, %
0	0.00	0.00	3.23	0	0	0.00
8	22.39	6.94	3.23	0.000	0.000	0.00
31	69.90	21.66	3.23	0.000	0.000	0.00
72	154.59	47.90	3.23	0.000	0.000	0.00
107	226.89	70.29	3.23	0.001	0.000	0.03
150	315.71	97.76	3.23	0.003	0.001	0.08
192	402.47	124.59	3.23	0.004	0.001	0.10
234	489.22	151.37	3.23	0.006	0.002	0.15
271	565.65	174.88	3.23	0.009	0.002	0.23
310	646.21	199.59	3.24	0.013	0.003	0.33
346	720.58	222.33	3.24	0.017	0.004	0.43
381	792.88	244.27	3.25	0.023	0.006	0.58
415	863.11	265.64	3.25	0.027	0.007	0.68
446	927.14	284.91	3.25	0.033	0.008	0.83
467	970.52	297.86	3.26	0.038	0.010	0.96
480	997.38	305.48	3.26	0.046	0.012	1.16



Maximum Load: 997.38 lbf
Total Strain: 1.16%
Unconfined Compressive Strength: 305 psi

Unconfined Compressive Strength Test

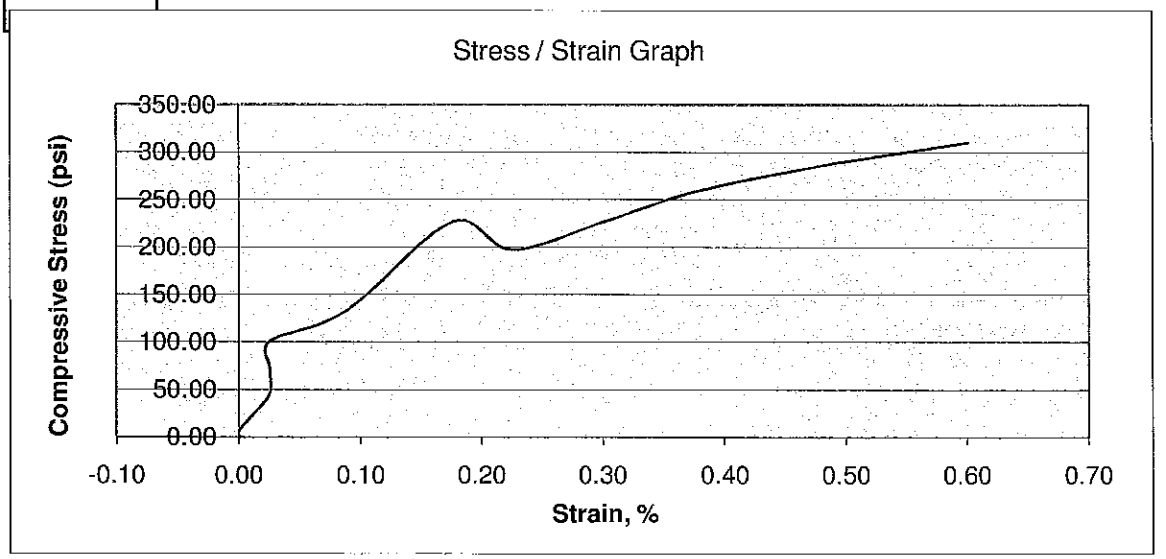
Client: Severstal Steel
Sample I.D.: 66%-20% PC
Cure Period: Day 3

Date:10/22/09
Proving Ring No.: 26266
Technician: TY / NAO'S

	Millimeters	Inches
Cylinder Height:	101.6	4.00
Cylinder Diameter:	52.1	2.05
Cylinder Radius:	26.05	1.03

Strain Rate: 1 %/min

Load - Dial Reading	Load (lbf)	Compressive Stress (psi)	Average Cross-sectional Area (in^2)	Deformation Dial Reading	Axial Strain (in.)	Axial Strain, %
0	0.00	0.00	3.30	0	0	0.00
10	26.52	8.03	3.30	0.000	0.000	0.00
39	86.42	26.16	3.30	0.001	0.000	0.01
72	154.59	46.79	3.30	0.001	0.000	0.03
113	239.28	72.43	3.30	0.001	0.000	0.03
159	334.30	101.19	3.30	0.001	0.000	0.03
210	439.65	133.00	3.31	0.004	0.001	0.09
360	749.50	226.53	3.31	0.007	0.002	0.18
314	654.48	197.72	3.31	0.009	0.002	0.23
361	751.56	226.87	3.31	0.012	0.003	0.30
412	856.91	258.48	3.32	0.015	0.004	0.38
455	945.74	284.99	3.32	0.019	0.005	0.48
496	1030.43	310.12	3.32	0.024	0.006	0.60



Maximum Load: 1030.43 lbf
Total Strain: 0.60%
Unconfined Compressive Strength: 310 psi

Unconfined Compressive Strength Test

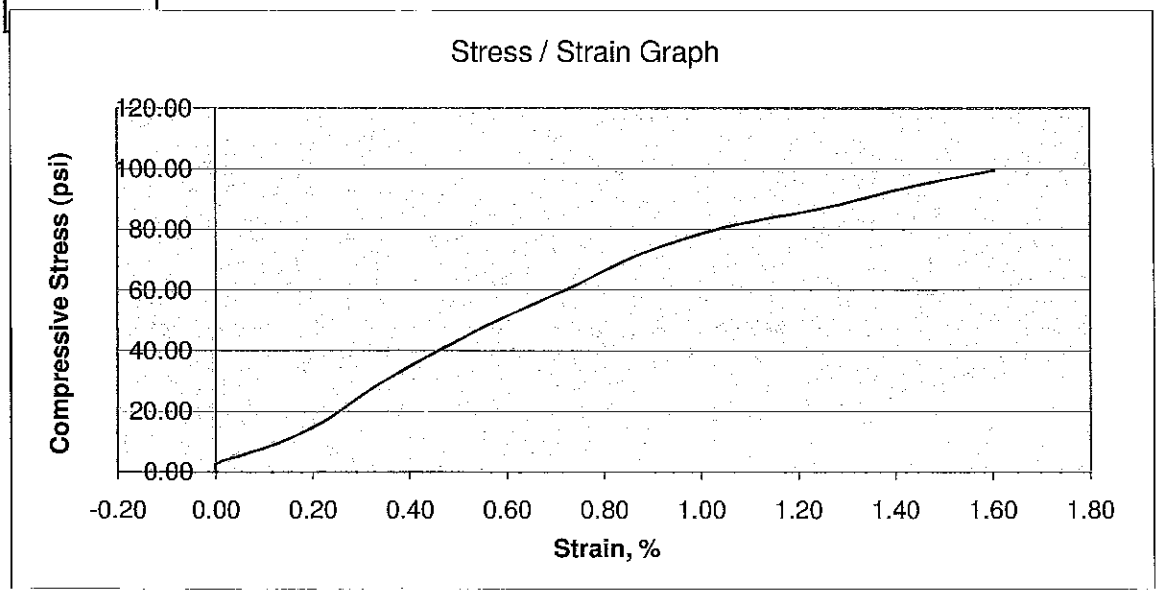
Client: Severstal Steel
Sample I.D.: 69%-10% PC
Cure Period: Day 3

Date:10/22/09
Proving Ring No.: 26266
Technician: TY / NAO'S

	Millimeters	Inches
Cylinder Height:	101.4	3.99
Cylinder Diameter:	51.3	2.02
Cylinder Radius:	25.65	1.01

Strain Rate: 1 %/min

Load - Dial Reading	Load (lbf)	Compressive Stress (psi)	Average Cross-sectional Area (in^2)	Deformation Dial Reading	Axial Strain (in.)	Axial Strain, %
0	0.00	0.00	3.20	0	0	0.00
2	9.99	3.12	3.20	0.000	0.000	0.00
12	30.65	9.56	3.21	0.005	0.001	0.13
24	55.44	17.27	3.21	0.009	0.002	0.23
41	90.55	28.19	3.21	0.013	0.003	0.33
57	123.60	38.43	3.22	0.018	0.004	0.44
75	160.78	49.92	3.22	0.023	0.006	0.58
92	195.90	60.73	3.23	0.029	0.007	0.73
110	233.08	72.15	3.23	0.035	0.009	0.88
124	262.00	80.96	3.24	0.042	0.011	1.05
134	282.66	87.17	3.24	0.05	0.013	1.25
145	305.38	94.01	3.25	0.057	0.014	1.43
154	323.97	99.55	3.25	0.064	0.016	1.60
158	332.23	101.91	3.26	0.071	0.018	1.78



Maximum Load: 332.23 lbf
Total Strain: 1.78%
Unconfined Compressive Strength: 102psi

Unconfined Compressive Strength Test

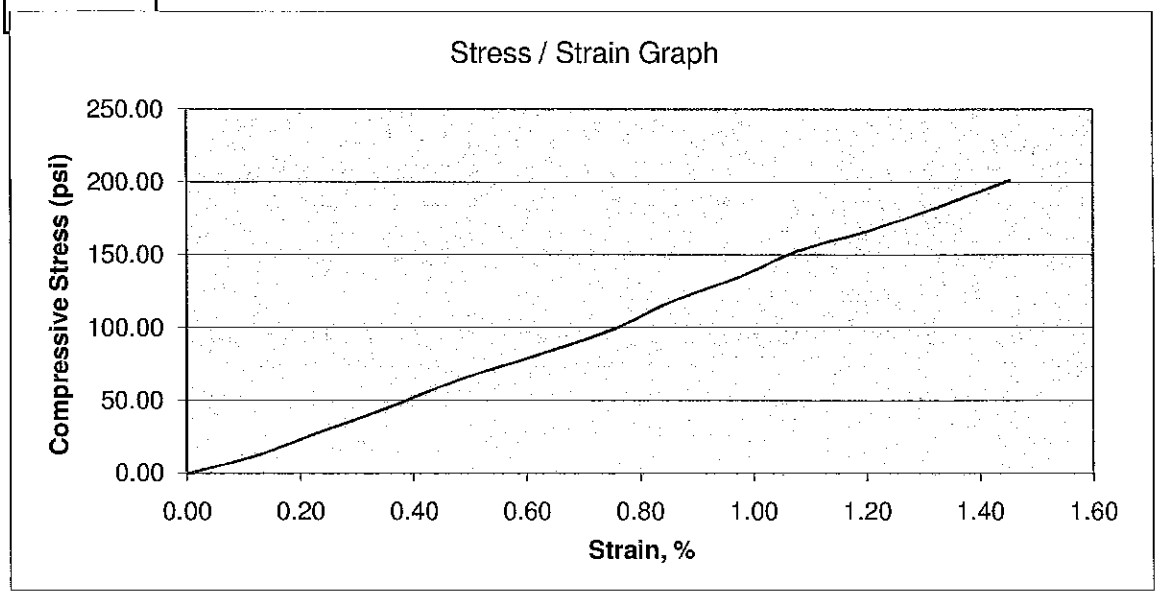
Client: Severstal Steel
Sample I.D.: 69%-15% PC
Cure Period: Day 3

Date:10/22/09
Proving Ring No.: 26266
Technician: TY / NAO'S

	Millimeters	Inches
Cylinder Height:	101.5	4.00
Cylinder Diameter:	52.1	2.05
Cylinder Radius:	26.05	1.03

Strain Rate: 1 %/min

Load - Dial Reading	Load (lbf)	Compressive Stress (psi)	Average Cross-sectional Area (in^2)	Deformation Dial Reading	Axial Strain (in.)	Axial Strain, %
0	0.00	0.00	3.30	0	0	0.00
18	43.04	13.02	3.31	0.005	0.001	0.13
41	90.55	27.36	3.31	0.009	0.002	0.23
69	148.39	44.77	3.31	0.014	0.004	0.35
100	212.43	64.01	3.32	0.019	0.005	0.48
130	274.40	82.56	3.32	0.025	0.006	0.63
157	330.17	99.22	3.33	0.030	0.008	0.75
187	392.14	117.72	3.33	0.034	0.009	0.85
216	452.04	135.53	3.34	0.039	0.010	0.98
244	509.88	152.72	3.34	0.043	0.011	1.08
267	557.39	166.74	3.34	0.048	0.012	1.20
294	613.16	183.19	3.35	0.053	0.013	1.33
324	675.13	201.45	3.35	0.058	0.015	1.45
349	726.78	216.64	3.35	0.062	0.016	1.55
372	774.29	230.45	3.36	0.068	0.017	1.70
386	803.20	238.63	3.37	0.075	0.019	1.88



Maximum Load: 803.20 lbf
Total Strain: 1.88%
Unconfined Compressive Strength: 239psi

Unconfined Compressive Strength Test

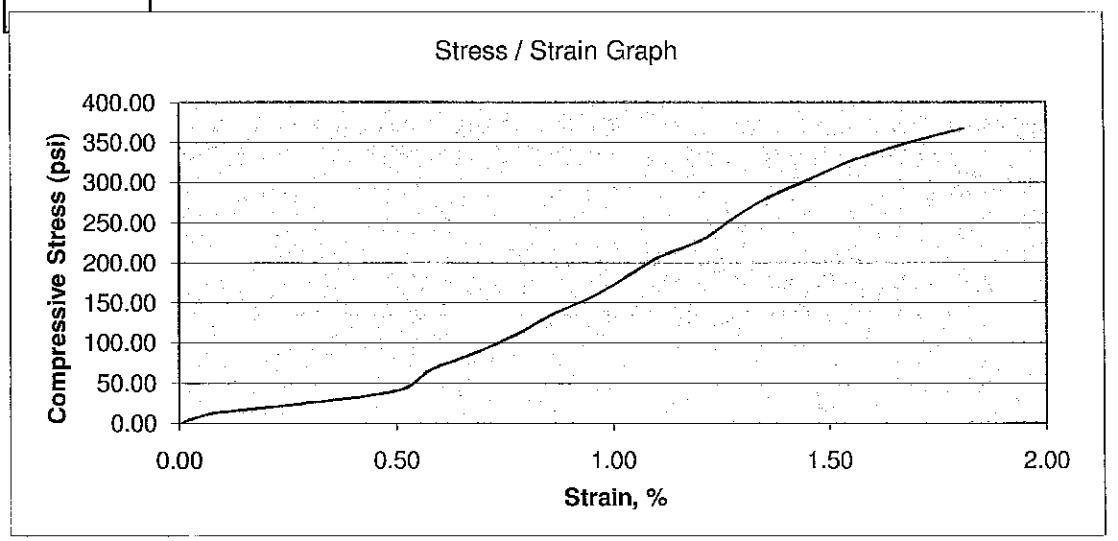
Client: Severstal Steel
Sample I.D.: 69%-20% PC
Cure Period: Day 3

Date:10/22/09
Proving Ring No.: 26266
Technician: TY / NAO'S

	Millimeters	Inches
Cylinder Height:	101.1	3.98
Cylinder Diameter:	51.2	2.02
Cylinder Radius:	25.6	1.01

Strain Rate: 1 %/min

Load - Dial Reading	Load (lbf)	Compressive Stress (psi)	Average Cross-sectional Area (in^2)	Deformation Dial Reading	Axial Strain (in.)	Axial Strain, %
0	0.00	0.00	3.19	0	0	0.00
5	16.19	5.07	3.19	0.001	0.000	0.03
17	40.98	12.84	3.19	0.003	0.001	0.08
35	78.16	24.44	3.20	0.011	0.003	0.28
61	131.87	41.13	3.21	0.020	0.005	0.50
101	214.49	66.86	3.21	0.023	0.006	0.58
133	280.59	87.37	3.21	0.027	0.007	0.68
171	359.09	111.70	3.21	0.031	0.008	0.78
207	433.45	134.73	3.22	0.034	0.009	0.85
245	511.95	158.97	3.22	0.038	0.010	0.95
283	590.44	183.21	3.22	0.041	0.010	1.03
321	668.94	207.40	3.23	0.044	0.011	1.11
356	741.23	229.59	3.23	0.048	0.012	1.21
400	832.12	257.54	3.23	0.051	0.013	1.28
438	910.62	281.62	3.23	0.054	0.014	1.36
476	989.11	305.58	3.24	0.058	0.015	1.46
513	1065.54	328.86	3.24	0.062	0.016	1.56
547	1135.78	350.09	3.24	0.067	0.017	1.68
575	1193.61	367.45	3.25	0.072	0.018	1.81
586	1216.34	373.96	3.25	0.077	0.019	1.93



Maximum Load: 1216.34 lbf
Total Strain: 1.93%
Unconfined Compressive Strength: 374 psi

Unconfined Compressive Strength Test

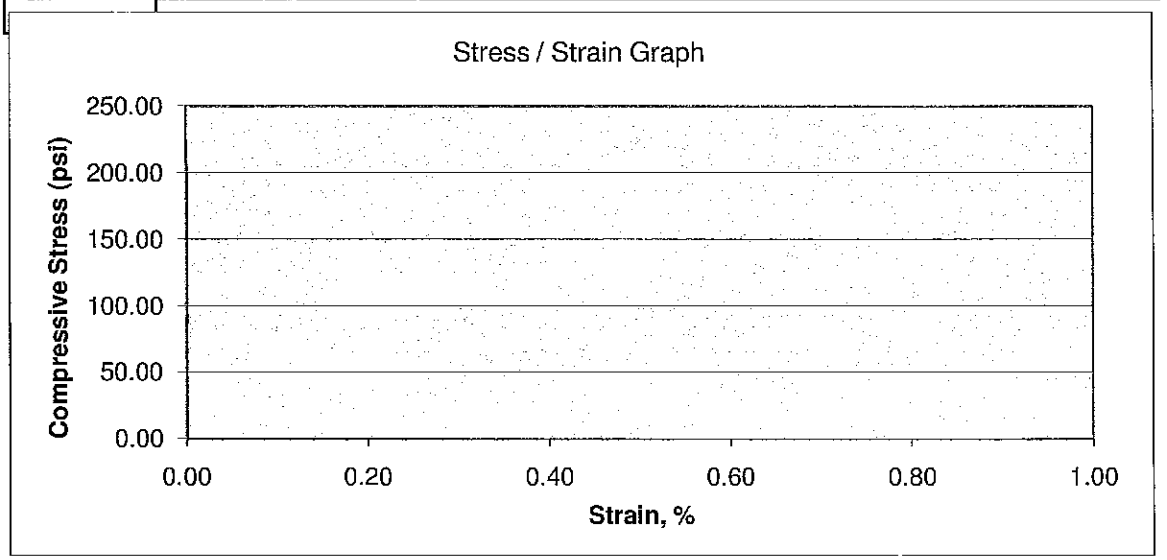
Client: Severstal Steel
Sample I.D.: 72%-10% PC
Cure Period: Day 3

Date:10/22/09
Proving Ring No.: 26266
Technician: TY / NAO'S

	Millimeters	Inches
Cylinder Height:	100.8	3.97
Cylinder Diameter:	51.6	2.03
Cylinder Radius:	25.8	1.02

Strain Rate: 1 %/min

Load - Dial Reading	Load (lbf)	Compressive Stress (psi)	Average Cross-sectional Area (in2)	Deformation Dial Reading	Axial Strain (in.)	Axial Strain, %
0	0.00	0.00	3.24	0	0	0.00
8	22.39	6.91	3.24	0.000	0.000	0.00
29	65.76	20.30	3.24	0.000	0.000	0.00
52	113.27	34.96	3.24	0.000	0.000	0.00
75	160.78	49.63	3.24	0.000	0.000	0.00
100	212.43	65.57	3.24	0.000	0.000	0.00
121	255.80	78.96	3.24	0.000	0.000	0.00
143	301.25	92.99	3.24	0.000	0.000	0.00
164	344.63	106.38	3.24	0.000	0.000	0.00
181	379.74	117.22	3.24	0.000	0.000	0.00
196	410.73	126.78	3.24	0.000	0.000	0.00
209	437.58	135.07	3.24	0.000	0.000	0.00
220	460.31	142.08	3.24	0.000	0.000	0.00
227	474.76	146.55	3.24	0.000	0.000	0.00
230	480.96	148.46	3.24	0.000	0.000	0.00
320	666.87	205.85	3.24	0.000	0.000	0.00



Maximum Load: 666.87 lbf
Total Strain:
Unconfined Compressive Strength: 212 psi

Comments: The needle for the Deformation Dial was stuck and did not move during testing.
The UCS was calculated by hand and is not from the table above.

Unconfined Compressive Strength Test

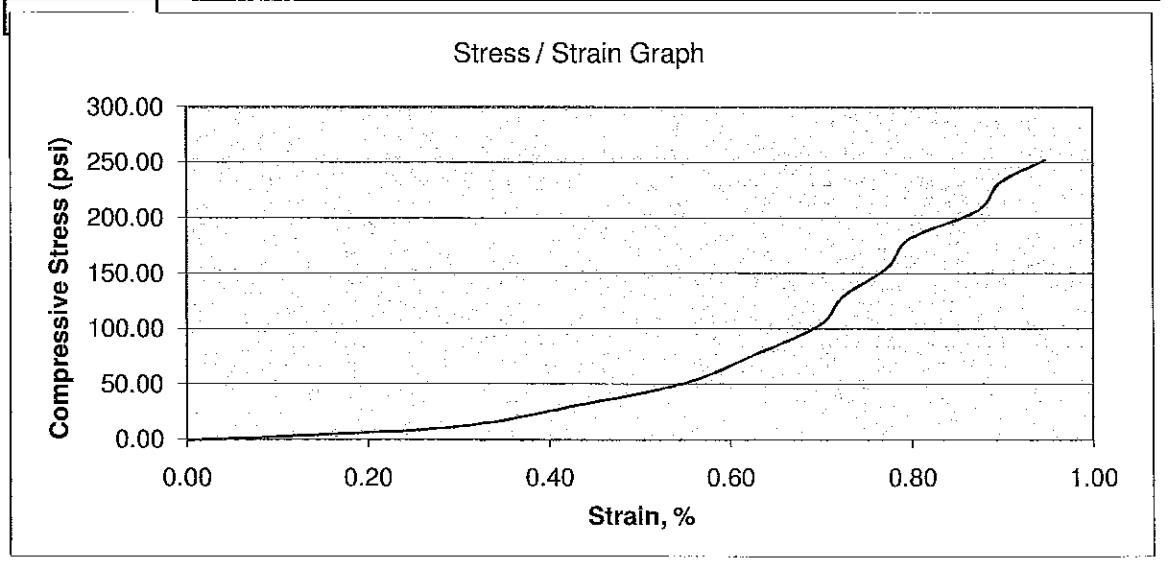
Client: Severstal Steel
Sample I.D.: 72%-15% PC
Cure Period: Day 3

Date:10/22/09
Proving Ring No.: 26266
Technician: TY / NAO'S

	Millimeters	Inches
Cylinder Height:	102.0	4.02
Cylinder Diameter:	52.2	2.06
Cylinder Radius:	26.1	1.03

Strain Rate: 1 %/min

Load - Dial Reading	Load (lbf)	Compressive Stress (psi)	Average Cross-sectional Area (in^2)	Deformation Dial Reading	Axial Strain (in.)	Axial Strain, %
0	0.00	0.00	3.32	0	0	0.00
4	14.12	4.25	3.32	0.005	0.001	0.12
17	40.98	12.32	3.33	0.012	0.003	0.30
46	100.88	30.30	3.33	0.017	0.004	0.42
80	171.11	51.33	3.33	0.022	0.005	0.55
120	253.74	76.06	3.34	0.025	0.006	0.62
165	346.69	103.84	3.34	0.028	0.007	0.70
206	431.39	129.17	3.34	0.029	0.007	0.72
249	520.21	155.69	3.34	0.031	0.008	0.77
291	606.97	181.61	3.34	0.032	0.008	0.80
332	691.66	206.80	3.34	0.035	0.009	0.87
373	776.35	232.06	3.35	0.036	0.009	0.90
406	844.52	252.31	3.35	0.038	0.009	0.95



Maximum Load: 844.52 lbf
Total Strain: 0.95%
Unconfined Compressive Strength: 252 psi

Unconfined Compressive Strength Test

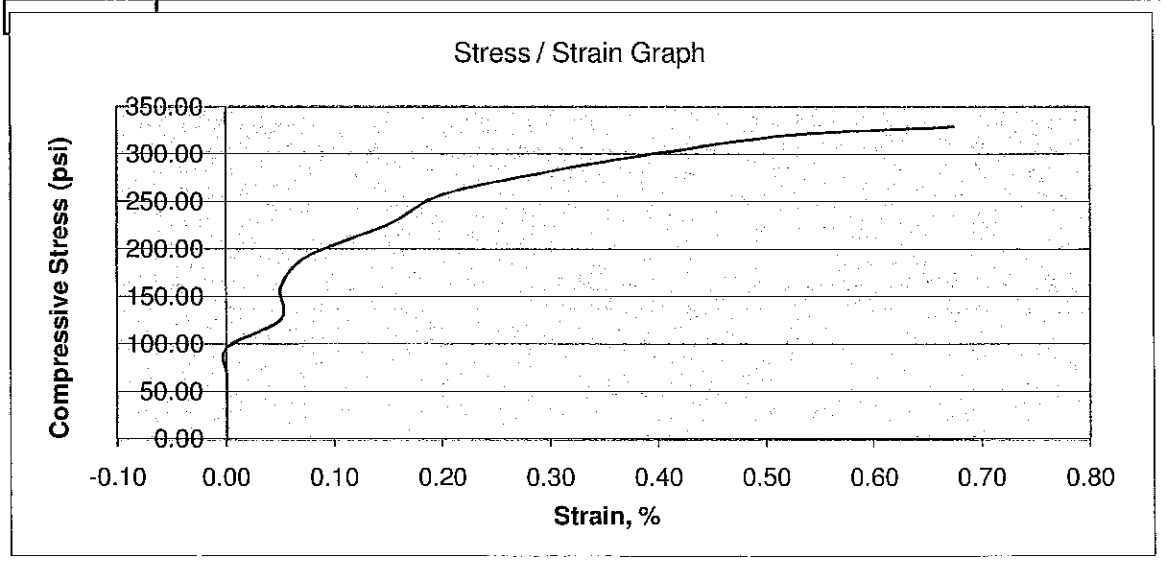
Client: Severstal Steel
Sample I.D.: 72%-20% PC
Cure Period: Day 3

Date:10/22/09
Proving Ring No.: 26266
Technician: TY / NAO'S

	Millimeters	Inches
Cylinder Height:	101.8	4.01
Cylinder Diameter:	51.1	2.01
Cylinder Radius:	25.55	1.01

Strain Rate: 1 %/min

Load - Dial Reading	Load (lbf)	Compressive Stress (psi)	Average Cross-sectional Area (in^2)	Deformation Dial Reading	Axial Strain (in.)	Axial Strain, %
0	0.00	0.00	3.18	0	0	0.00
19	45.11	14.20	3.18	0.000	0.000	0.00
57	123.60	38.90	3.18	0.000	0.000	0.00
100	212.43	66.86	3.18	0.000	0.000	0.00
146	307.45	96.77	3.18	0.000	0.000	0.00
192	402.47	126.61	3.18	0.002	0.000	0.05
245	511.95	161.05	3.18	0.002	0.000	0.05
294	613.16	192.85	3.18	0.003	0.001	0.07
346	720.58	226.46	3.18	0.006	0.001	0.15
394	819.73	257.49	3.18	0.008	0.002	0.20
432	898.23	281.86	3.19	0.012	0.003	0.30
462	960.19	301.01	3.19	0.016	0.004	0.40
492	1022.16	320.03	3.19	0.021	0.005	0.52
506	1051.08	328.59	3.20	0.027	0.007	0.67



Maximum Load: 1051.08 lbf
Total Strain: 0.67%
Unconfined Compressive Strength: 329 psi

Unconfined Compressive Strength Test

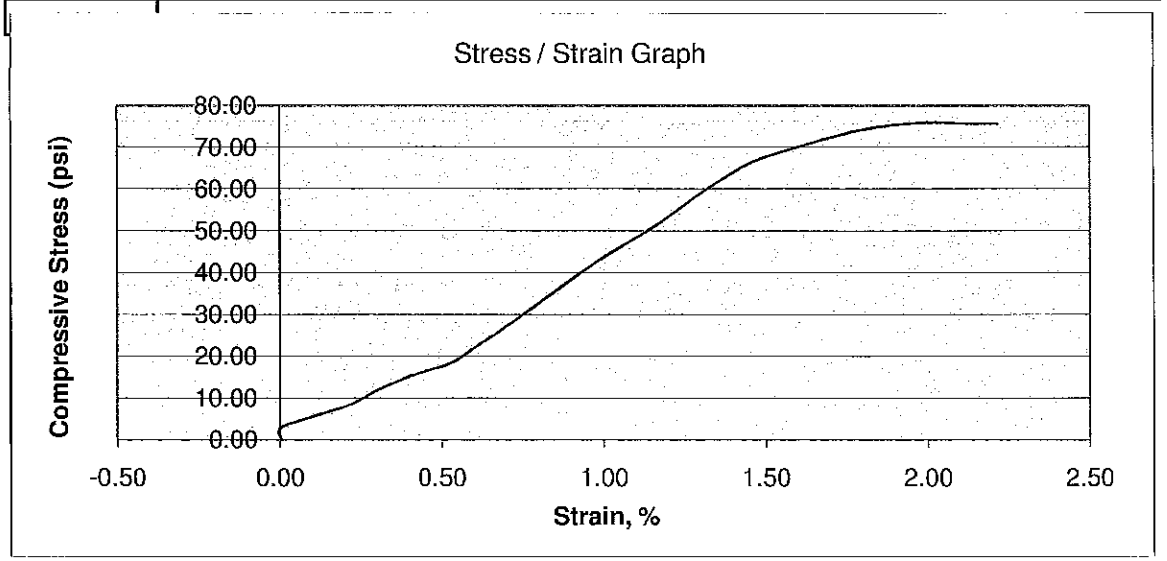
Client: Severstal Steel
Sample I.D.: 66%-10% PC
Cure Period: Day 7

Date:10/26/09
Proving Ring No.: 26266
Technician: CJ / NAO'S

	Millimeters	Inches
Cylinder Height:	101.0	3.98
Cylinder Diameter:	51.1	2.01
Cylinder Radius:	25.55	1.01

Strain Rate: 1 %/min

Load - Dial Reading	Load (lbf)	Compressive Stress (psi)	Average Cross-sectional Area (in^2)	Deformation Dial Reading	Axial Strain (in.)	Axial Strain, %
0	0.00	0.00	3.18	0	0	0.00
2	9.99	3.14	3.18	0.000	0.000	0.00
7	20.32	6.39	3.18	0.005	0.001	0.13
11	28.58	8.98	3.18	0.009	0.002	0.23
16	38.91	12.21	3.19	0.012	0.003	0.30
21	49.24	15.44	3.19	0.016	0.004	0.40
26	59.57	18.65	3.19	0.021	0.005	0.53
32	71.96	22.51	3.20	0.024	0.006	0.60
38	84.35	26.37	3.20	0.027	0.007	0.68
51	111.21	34.71	3.20	0.033	0.008	0.83
64	138.06	43.03	3.21	0.039	0.010	0.98
77	164.92	51.31	3.21	0.046	0.012	1.16
90	191.77	59.57	3.22	0.052	0.013	1.31
101	214.49	66.53	3.22	0.058	0.015	1.46
108	228.95	70.88	3.23	0.065	0.016	1.63
113	239.28	73.97	3.23	0.071	0.018	1.79
116	245.48	75.75	3.24	0.078	0.020	1.96
116	245.48	75.55	3.25	0.088	0.022	2.21



Maximum Load: 245.48 lbf
Total Strain: 1.96%
Unconfined Compressive Strength: 76 psi

Unconfined Compressive Strength Test

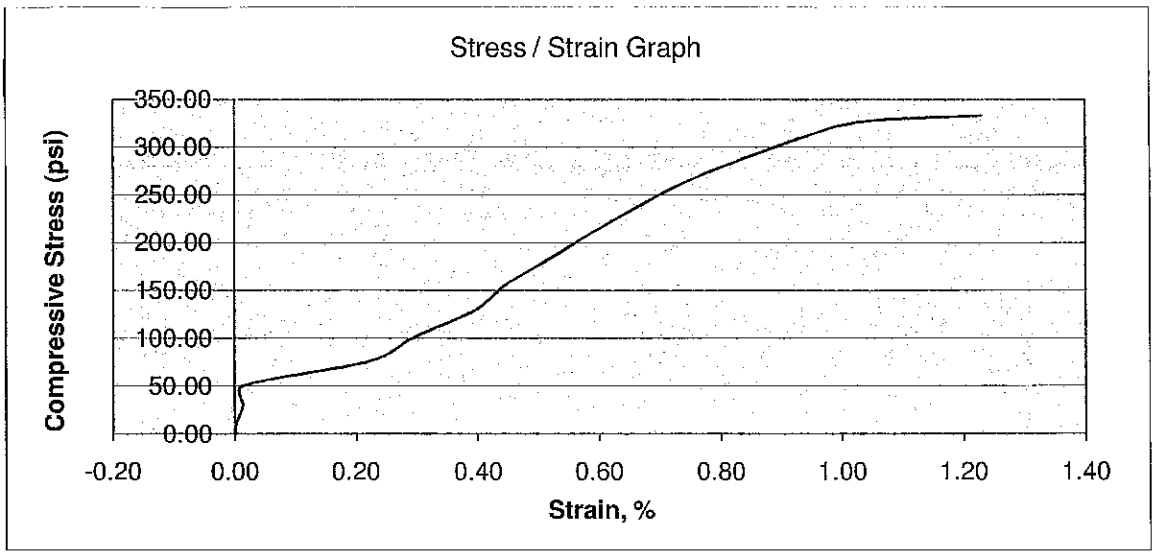
Client: Severstal Steel
Sample I.D.: 66%-15% PC
Cure Period: Day 7

Date:10/26/09
Proving Ring No.: 26266
Technician: CJ / NAO'S

	Millimeters	Inches
Cylinder Height:	103.4	4.07
Cylinder Diameter:	51.1	2.01
Cylinder Radius:	25.55	1.01

Strain Rate: 1 %/min

Load - Dial Reading	Load (lbf)	Compressive Stress (psi)	Average Cross-sectional Area (in^2)	Deformation Dial Reading	Axial Strain (in.)	Axial Strain, %
0	0.00	0.00	3.18	0	0	0.00
11	28.58	9.00	3.18	0.000	0.000	0.00
44	96.75	30.45	3.18	0.001	0.000	0.01
75	160.78	50.60	3.18	0.001	0.000	0.01
115	243.41	76.44	3.18	0.009	0.002	0.22
154	323.97	101.67	3.19	0.012	0.003	0.29
197	412.79	129.41	3.19	0.016	0.004	0.39
237	495.42	155.24	3.19	0.018	0.004	0.44
280	584.24	182.94	3.19	0.021	0.005	0.52
325	677.20	211.89	3.20	0.024	0.006	0.59
366	761.89	238.21	3.20	0.027	0.007	0.66
404	840.39	262.56	3.20	0.03	0.007	0.74
444	923.01	288.09	3.20	0.034	0.008	0.84
479	995.31	310.34	3.21	0.038	0.009	0.93
505	1049.02	326.77	3.21	0.042	0.010	1.03
516	1071.74	333.18	3.22	0.05	0.012	1.23



Maximum Load: 1071.74 lbf
Total Strain: 1.23%
Unconfined Compressive Strength: 333 psi

Unconfined Compressive Strength Test

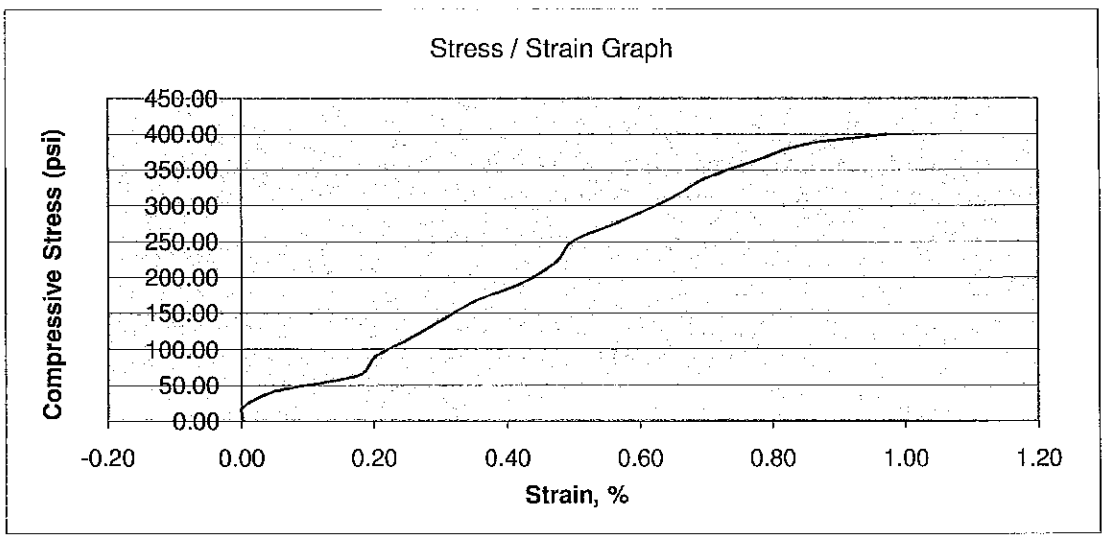
Client: Severstal Steel
Sample I.D.: 66%-20% PC
Cure Period: Day 7

Date:10/26/09
Proving Ring No.: 26266
Technician: CJ / NAO'S

	Millimeters	Inches
Cylinder Height:	101.9	4.01
Cylinder Diameter:	52.0	2.05
Cylinder Radius:	26	1.02

Strain Rate: 1 %/min

Load - Dial Reading	Load (lbf)	Compressive Stress (psi)	Average Cross-sectional Area (in^2)	Deformation Dial Reading	Axial Strain (in.)	Axial Strain, %
0	0.00	0.00	3.29	0	0	0.00
11	28.58	8.69	3.29	0.000	0.000	0.00
28	63.70	19.36	3.29	0.000	0.000	0.00
64	138.06	41.94	3.29	0.002	0.000	0.05
99	210.36	63.83	3.30	0.007	0.002	0.17
140	295.05	89.50	3.30	0.008	0.002	0.20
179	375.61	113.88	3.30	0.010	0.002	0.25
221	462.37	140.11	3.30	0.012	0.003	0.30
264	551.19	166.95	3.30	0.014	0.003	0.35
307	640.02	193.70	3.30	0.017	0.004	0.42
354	737.10	222.98	3.31	0.019	0.005	0.47
399	830.06	251.03	3.31	0.02	0.005	0.50
446	927.14	280.18	3.31	0.023	0.006	0.57
497	1032.49	311.79	3.31	0.026	0.006	0.65
540	1121.32	338.44	3.31	0.028	0.007	0.70
580	1203.94	363.10	3.32	0.031	0.008	0.77
617	1280.37	385.86	3.32	0.034	0.008	0.85
641	1329.95	400.30	3.32	0.039	0.010	0.97



Maximum Load: 1329.95 lbf
Total Strain: 0.97%
Unconfined Compressive Strength: 401 psi

Unconfined Compressive Strength Test

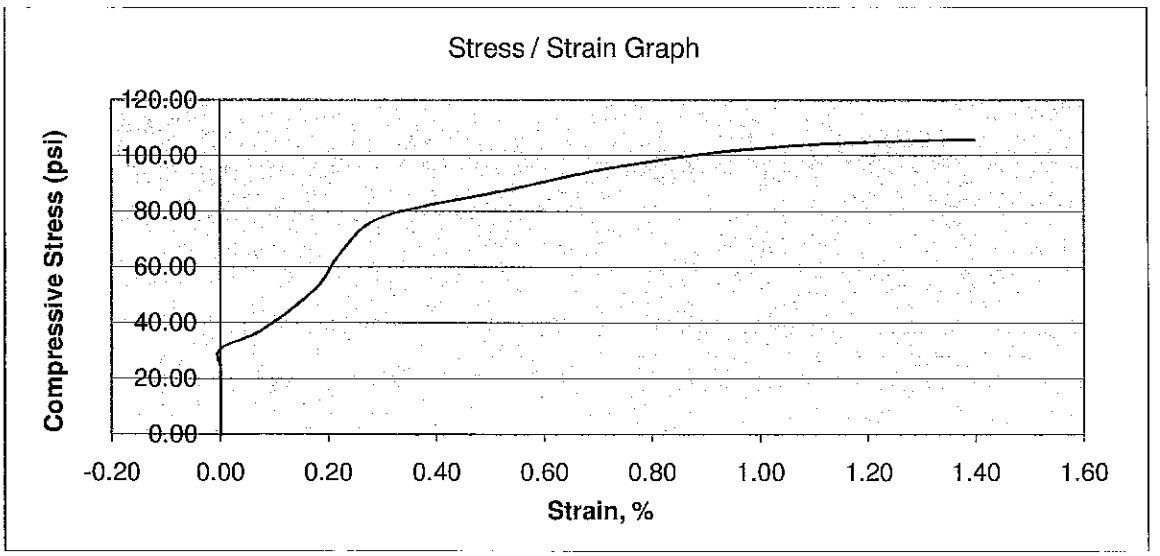
Client: Severstal Steel
Sample I.D.: 69%-10% PC
Cure Period: Day 7

Date:10/26/09
Proving Ring No.: 26266
Technician: CJ / NAO'S

	Millimeters	Inches
Cylinder Height:	101.9	4.01
Cylinder Diameter:	51.2	2.02
Cylinder Radius:	25.6	1.01

Strain Rate: 1 %/min

Load - Dial Reading	Load (lbf)	Compressive Stress (psi)	Average Cross-sectional Area (in^2)	Deformation Dial Reading	Axial Strain (in.)	Axial Strain, %
0	0.00	0.00	3.19	0	0	0.00
5	16.19	5.08	3.19	0.000	0.000	0.00
9	24.45	7.67	3.19	0.000	0.000	0.00
15	36.84	11.55	3.19	0.000	0.000	0.00
19	45.11	14.14	3.19	0.000	0.000	0.00
27	61.63	19.32	3.19	0.000	0.000	0.00
34	76.09	23.86	3.19	0.000	0.000	0.00
45	98.81	30.98	3.19	0.000	0.000	0.00
55	119.47	37.43	3.19	0.003	0.001	0.07
78	166.98	52.26	3.20	0.007	0.002	0.17
99	210.36	65.80	3.20	0.009	0.002	0.22
118	249.61	78.02	3.20	0.012	0.003	0.30
133	280.59	87.51	3.21	0.021	0.005	0.52
146	307.45	95.69	3.21	0.029	0.007	0.72
156	328.10	101.89	3.22	0.038	0.009	0.95
161	338.43	104.86	3.23	0.047	0.012	1.17
163	342.56	105.90	3.23	0.056	0.014	1.40



Maximum Load: 342.56 lbf
Total Strain: 1.40%
Unconfined Compressive Strength: 106 psi

Unconfined Compressive Strength Test

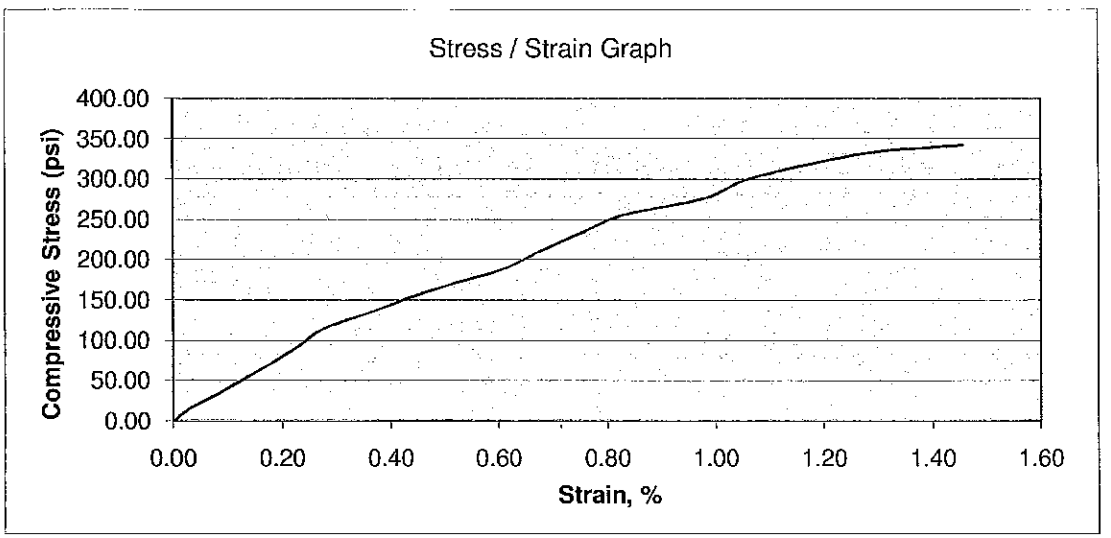
Client: Severstal Steel
Sample I.D.: 69%-15% PC
Cure Period: Day 7

Date:10/26/09
Proving Ring No.: 26266
Technician: CJ / NAO'S

	Millimeters	Inches
Cylinder Height:	101.2	3.98
Cylinder Diameter:	51.7	2.04
Cylinder Radius:	25.85	1.02

Strain Rate: 1 %/min

Load - Dial Reading	Load (lbf)	Compressive Stress (psi)	Average Cross-sectional Area (in^2)	Deformation Dial Reading	Axial Strain (in.)	Axial Strain, %
0	0.00	0.00	3.25	0	0	0.00
20	47.17	14.50	3.25	0.001	0.000	0.03
48	105.01	32.26	3.25	0.003	0.001	0.08
79	169.05	51.91	3.26	0.005	0.001	0.13
109	231.02	70.91	3.26	0.007	0.002	0.18
142	299.18	91.79	3.26	0.009	0.002	0.23
179	375.61	115.18	3.26	0.011	0.003	0.28
216	452.04	138.47	3.26	0.015	0.004	0.38
255	532.60	162.98	3.27	0.019	0.005	0.48
295	615.23	188.03	3.27	0.024	0.006	0.60
333	693.72	211.86	3.27	0.027	0.007	0.68
369	768.09	234.39	3.28	0.03	0.008	0.75
403	838.32	255.63	3.28	0.033	0.008	0.83
437	908.55	276.63	3.28	0.039	0.010	0.98
473	982.92	299.04	3.29	0.042	0.011	1.05
507	1053.15	320.00	3.29	0.047	0.012	1.18
531	1102.73	334.64	3.30	0.052	0.013	1.31
544	1129.58	342.27	3.30	0.058	0.015	1.46



Maximum Load: 1129.58 lbf
Total Strain: 1.46%
Unconfined Compressive Strength: 343 psi

Unconfined Compressive Strength Test

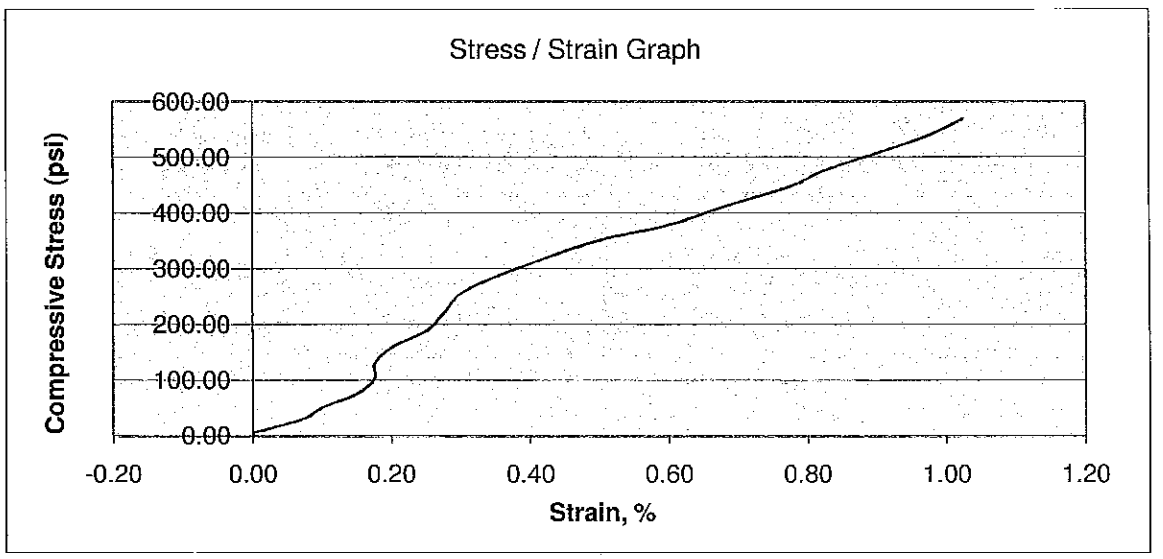
Client: Severstal Steel
Sample I.D.: 69%-20% PC
Cure Period: Day 7

Date:10/26/09
Proving Ring No.: 26266
Technician: CJ / NAO'S

	Millimeters	Inches
Cylinder Height:	101.8	4.01
Cylinder Diameter:	50.5	1.99
Cylinder Radius:	25.25	0.99

Strain Rate: 1 %/min

Load - Dial Reading	Load (lbf)	Compressive Stress (psi)	Average Cross-sectional Area (in2)	Deformation Dial Reading	Axial Strain (in.)	Axial Strain, %
0	0.00	0.00	3.10	0.000	0	0.00
7	20.32	6.55	3.10	0.000	0.000	0.00
20	47.17	15.20	3.10	0.001	0.000	0.02
47	102.95	33.15	3.11	0.003	0.001	0.07
76	162.85	52.43	3.11	0.004	0.001	0.10
113	239.28	77.00	3.11	0.006	0.001	0.15
154	323.97	104.22	3.11	0.007	0.002	0.17
194	406.60	130.80	3.11	0.007	0.002	0.17
237	495.42	159.34	3.11	0.008	0.002	0.20
283	590.44	189.81	3.11	0.010	0.002	0.25
331	689.59	221.62	3.11	0.011	0.003	0.27
384	799.07	256.74	3.11	0.012	0.003	0.30
429	892.03	286.47	3.11	0.014	0.003	0.35
482	1001.51	321.38	3.12	0.017	0.004	0.42
528	1096.53	351.61	3.12	0.020	0.005	0.50
570	1183.29	379.05	3.12	0.024	0.006	0.60
617	1280.37	409.84	3.12	0.027	0.007	0.67
675	1400.18	447.74	3.13	0.031	0.008	0.77
719	1491.07	476.57	3.13	0.033	0.008	0.82
766	1588.16	507.21	3.13	0.036	0.009	0.90
815	1689.37	539.13	3.13	0.039	0.010	0.97
861	1784.39	569.17	3.14	0.041	0.010	1.02



Maximum Load: 1784.39 lbf
Total Strain: 1.02%
Unconfined Compressive Strength: 569 psi

Unconfined Compressive Strength Test

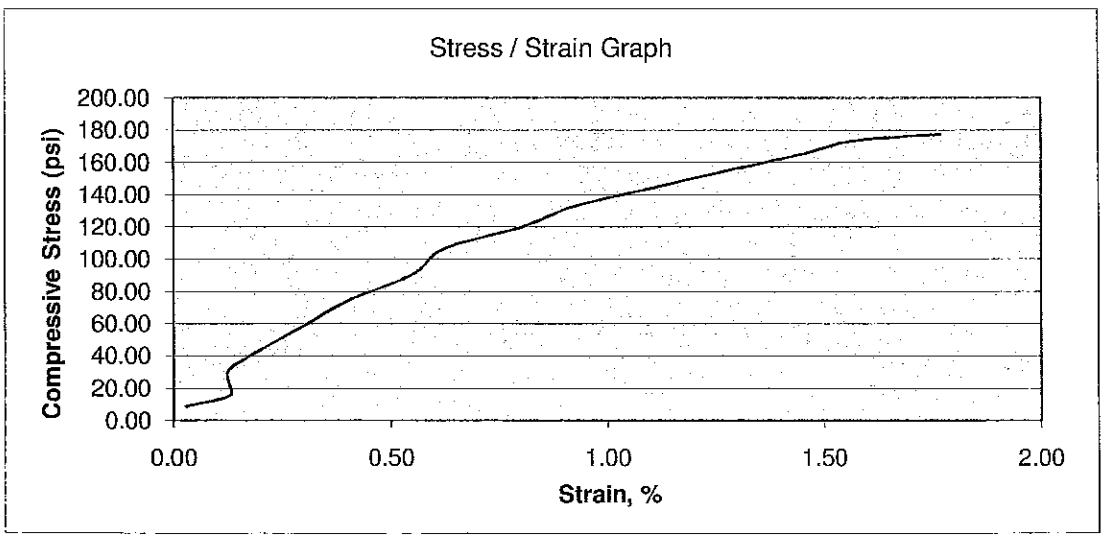
Client: Severstal Steel
Sample I.D.: 72%-10% PC
Cure Period: Day 7

Date:10/26/09
Proving Ring No.: 26266
Technician: CJ / NAO'S

	Millimeters	Inches
Cylinder Height:	102.1	4.02
Cylinder Diameter:	51.9	2.04
Cylinder Radius:	25.95	1.02

Strain Rate: 1 %/min

Load - Dial Reading	Load (lbf)	Compressive Stress (psi)	Average Cross-sectional Area (in^2)	Deformation Dial Reading	Axial Strain (in.)	Axial Strain, %
0	0.00	0.00	3.28	0	0	0.00
3	12.06	3.68	3.28	0.001	0.000	0.02
12	30.65	9.35	3.28	0.001	0.000	0.02
22	51.30	15.63	3.28	0.005	0.001	0.12
34	76.09	23.19	3.28	0.005	0.001	0.12
48	105.01	32.00	3.28	0.005	0.001	0.12
68	146.32	44.56	3.28	0.008	0.002	0.20
92	195.90	59.59	3.29	0.012	0.003	0.30
116	245.48	74.60	3.29	0.016	0.004	0.40
142	299.18	90.79	3.30	0.022	0.005	0.55
168	352.89	107.00	3.30	0.025	0.006	0.62
189	396.27	119.95	3.30	0.032	0.008	0.80
210	439.65	132.91	3.31	0.037	0.009	0.92
228	476.83	143.90	3.31	0.044	0.011	1.09
246	514.01	154.84	3.32	0.051	0.013	1.27
263	549.13	165.13	3.33	0.058	0.014	1.44
277	578.05	173.61	3.33	0.063	0.016	1.57
284	592.51	177.59	3.34	0.071	0.018	1.77



Maximum Load: 592.51 lbf
Total Strain: 1.77%
Unconfined Compressive Strength: 178 psi

Unconfined Compressive Strength Test

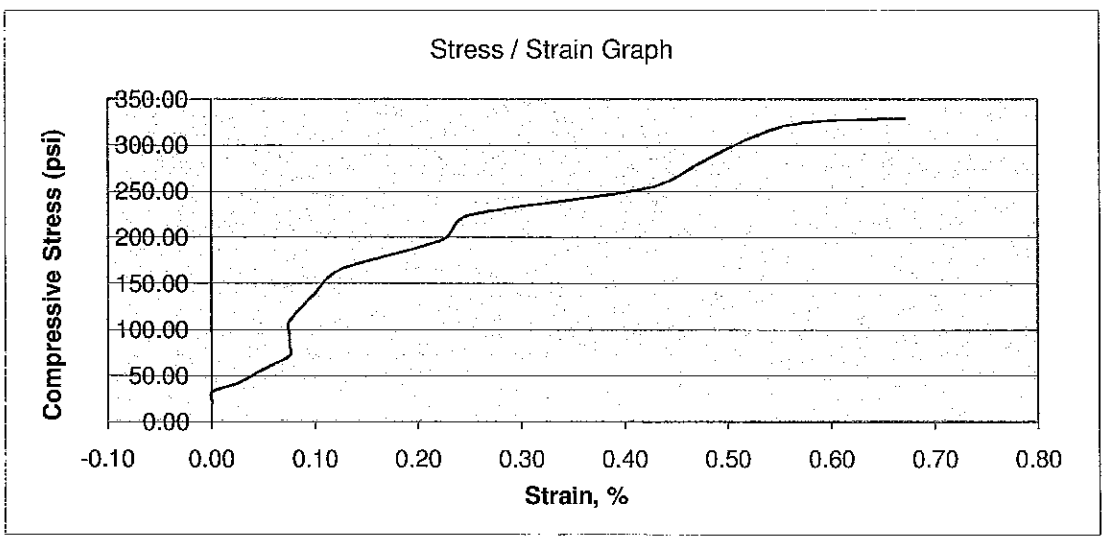
Client: Severstal Steel
Sample I.D.: 72%-15% PC
Cure Period: Day 7

Date:10/26/09
Proving Ring No.: 26266
Technician: CJ / NAO'S

	Millimeters	Inches
Cylinder Height:	102.3	4.03
Cylinder Diameter:	50.7	2.00
Cylinder Radius:	25.35	1.00

Strain Rate: 1 %/min

Load - Dial Reading	Load (lbf)	Compressive Stress (psi)	Average Cross-sectional Area (in^2)	Deformation Dial Reading	Axial Strain (in.)	Axial Strain, %
0	0.00	0.00	3.13	0	0	0.00
13	32.71	10.46	3.13	0.000	0.000	0.00
28	63.70	20.37	3.13	0.000	0.000	0.00
47	102.95	32.91	3.13	0.000	0.000	0.00
61	131.87	42.15	3.13	0.001	0.000	0.02
84	179.38	57.32	3.13	0.002	0.000	0.05
106	224.82	71.83	3.13	0.003	0.001	0.07
124	262.00	83.71	3.13	0.003	0.001	0.07
142	299.18	95.59	3.13	0.003	0.001	0.07
163	342.56	109.45	3.13	0.003	0.001	0.07
209	437.58	139.77	3.13	0.004	0.001	0.10
248	518.14	165.46	3.13	0.005	0.001	0.12
298	621.43	198.24	3.13	0.009	0.002	0.22
338	704.05	224.55	3.14	0.010	0.002	0.25
384	799.07	254.41	3.14	0.017	0.004	0.42
425	883.77	281.23	3.14	0.019	0.005	0.47
467	970.52	308.69	3.14	0.021	0.005	0.52
492	1022.16	324.95	3.15	0.023	0.006	0.57
500	1038.69	329.87	3.15	0.027	0.007	0.67



Maximum Load: 1038.69 lbf
Total Strain: 0.67%
Unconfined Compressive Strength: 330 psi

Unconfined Compressive Strength Test

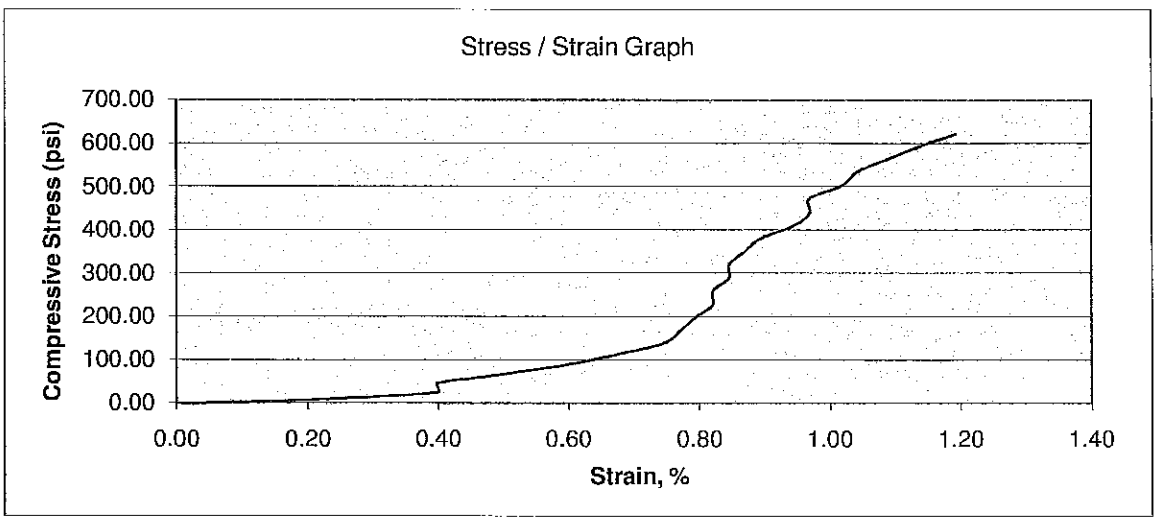
Client: Severstal Steel
Sample I.D.: 72%-20% PC
Cure Period: Day 7

Date:10/26/09
Proving Ring No.: 26266
Technician: CJ / NAO'S

	Millimeters	Inches
Cylinder Height:	102.4	4.03
Cylinder Diameter:	52.3	2.06
Cylinder Radius:	26.15	1.03

Strain Rate: 1 %/min

Load - Dial Reading	Load (lbf)	Compressive Stress (psi)	Average Cross-sectional Area (in2)	Deformation Dial Reading	Axial Strain (in.)	Axial Strain, %
0	0.00	0.00	3.33	0.000	0	0.00
0	5.86	1.76	3.33	0.003	0.001	0.07
16	38.91	11.66	3.34	0.010	0.002	0.25
38	84.35	25.25	3.34	0.016	0.004	0.40
72	154.59	46.26	3.34	0.020	0.004	0.40
105	222.75	66.60	3.34	0.024	0.005	0.50
143	301.25	89.98	3.35	0.027	0.006	0.60
179	375.61	112.10	3.35	0.030	0.007	0.67
223	466.50	139.13	3.35	0.031	0.007	0.74
270	563.59	168.04	3.35	0.032	0.008	0.77
323	673.07	200.63	3.35	0.033	0.008	0.79
367	763.96	227.66	3.36	0.033	0.008	0.82
420	873.44	260.29	3.36	0.034	0.008	0.82
468	972.59	289.77	3.36	0.034	0.008	0.84
518	1075.87	320.54	3.36	0.035	0.008	0.84
568	1179.15	351.22	3.36	0.036	0.009	0.87
617	1280.37	381.27	3.36	0.038	0.009	0.89
664	1377.46	409.98	3.36	0.039	0.009	0.94
713	1478.68	439.99	3.36	0.039	0.010	0.97
767	1590.22	473.19	3.36	0.041	0.010	0.97
816	1691.44	503.05	3.36	0.042	0.010	1.02
870	1802.98	536.09	3.36	0.044	0.010	1.04
920	1906.27	566.52	3.36	0.046	0.011	1.09
969	2007.48	596.30	3.37	0.048	0.011	1.14
1010	2092.18	621.14	3.37	0.051	0.012	1.19



Maximum Load: 2092.18 lbf
Total Strain: 1.19%
Unconfined Compressive Strength: 621 psi

Unconfined Compressive Strength Test

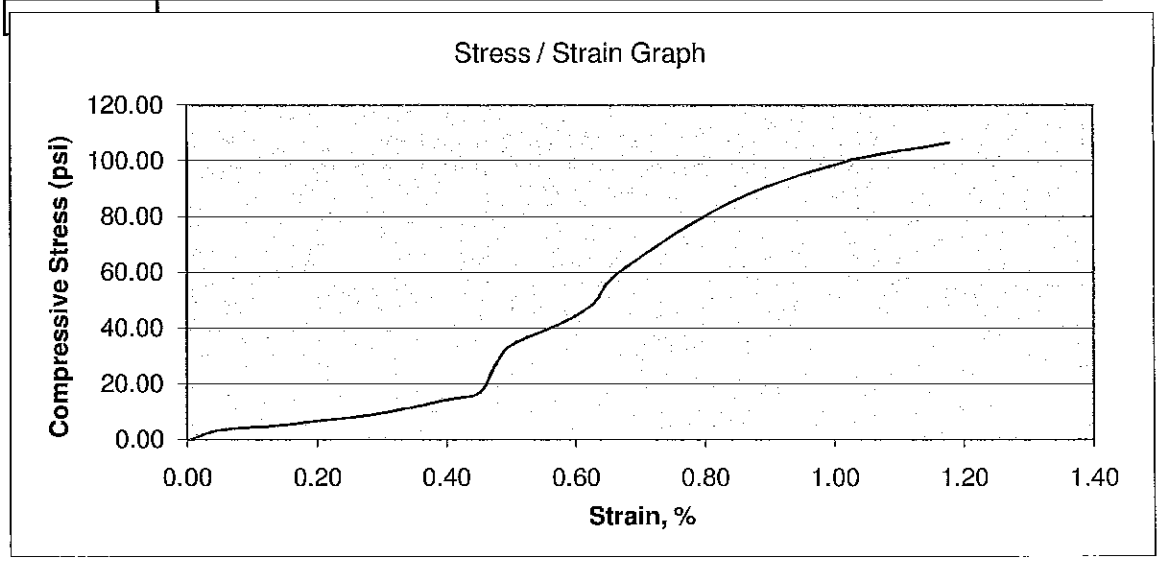
Client: Severstal Steel
Sample I.D.: 66%-10% PC
Cure Period: Day 28

Date:11/16/09
Proving Ring No.: 26266
Technician: CJ / NAO'S

	Millimeters	Inches
Cylinder Height:	101.5	4.00
Cylinder Diameter:	51.6	2.03
Cylinder Radius:	25.8	1.02

Strain Rate: 1 %/min

Load - Dial Reading	Load (lbf)	Compressive Stress (psi)	Average Cross-sectional Area (in^2)	Deformation Dial Reading	Axial Strain (in.)	Axial Strain, %
0	0.00	0.00	3.24	0	0	0.00
3	12.06	3.72	3.24	0.002	0.001	0.05
5	16.19	4.99	3.24	0.005	0.001	0.13
8	22.39	6.90	3.25	0.008	0.002	0.20
11	28.58	8.80	3.25	0.011	0.003	0.28
16	38.91	11.97	3.25	0.014	0.004	0.35
20	47.17	14.50	3.25	0.016	0.004	0.40
24	55.44	17.03	3.25	0.018	0.005	0.45
40	88.49	27.18	3.26	0.019	0.005	0.48
51	111.21	34.16	3.26	0.02	0.005	0.50
63	136.00	41.74	3.26	0.023	0.006	0.58
74	158.72	48.69	3.26	0.025	0.006	0.63
87	185.57	56.91	3.26	0.026	0.007	0.65
101	214.49	65.74	3.26	0.028	0.007	0.70
119	251.67	77.08	3.26	0.031	0.008	0.78
138	290.92	89.01	3.27	0.035	0.009	0.88
156	328.10	100.24	3.27	0.041	0.010	1.03
166	348.76	106.39	3.28	0.047	0.012	1.18



Maximum Load: 348.76 lbf
Total Strain: 1.18%
Unconfined Compressive Strength: 106 psi

Unconfined Compressive Strength Test

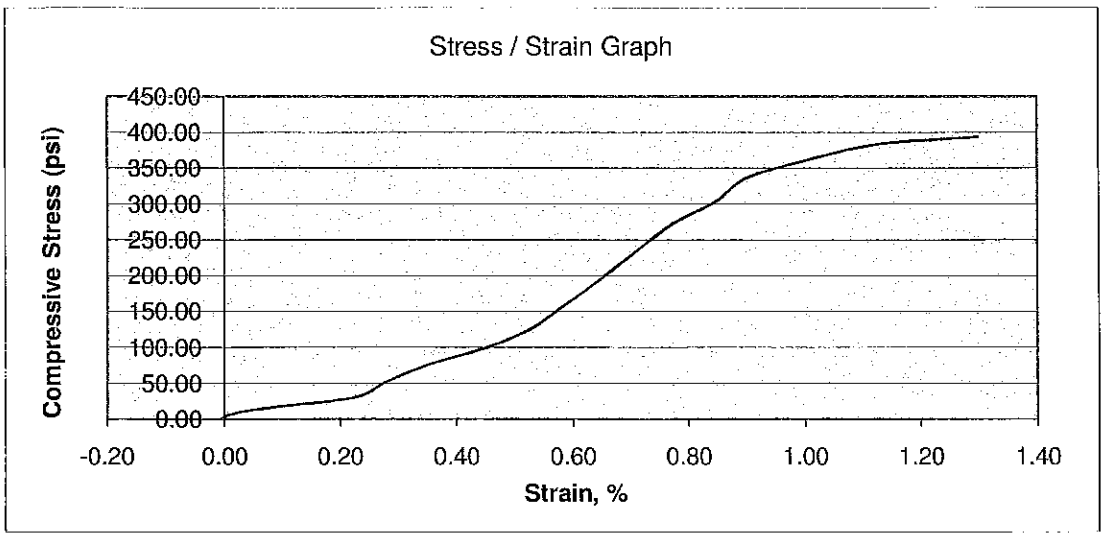
Client: Severstal Steel
Sample I.D.: 66%-15% PC
Cure Period: Day 28

Date:11/16/09
Proving Ring No.: 26266
Technician: CJ / NAO'S

	Millimeters	Inches
Cylinder Height:	101.9	4.01
Cylinder Diameter:	51.7	2.04
Cylinder Radius:	25.85	1.02

Strain Rate: 1 %/min

Load - Dial Reading	Load (lbf)	Compressive Stress (psi)	Average Cross-sectional Area (in2)	Deformation Dial Reading	Axial Strain (in.)	Axial Strain, %
0	0.00	0.00	3.25	0.000	0	0.00
4	14.12	4.34	3.25	0.000	0.000	0.00
13	32.71	10.06	3.25	0.001	0.000	0.02
23	53.37	16.40	3.25	0.003	0.001	0.07
46	100.88	30.95	3.26	0.009	0.002	0.22
78	166.98	51.20	3.26	0.011	0.003	0.27
117	247.54	75.85	3.26	0.014	0.003	0.35
155	326.04	99.80	3.27	0.018	0.004	0.45
195	408.66	125.00	3.27	0.021	0.005	0.52
239	499.55	152.72	3.27	0.023	0.006	0.57
284	592.51	181.05	3.27	0.025	0.006	0.62
333	693.72	211.87	3.27	0.027	0.007	0.67
383	797.01	243.29	3.28	0.029	0.007	0.72
431	896.16	273.42	3.28	0.031	0.008	0.77
481	999.44	304.71	3.28	0.034	0.008	0.85
531	1102.73	336.02	3.28	0.036	0.009	0.90
570	1183.29	360.21	3.28	0.040	0.010	1.00
607	1259.72	382.99	3.29	0.045	0.011	1.12
626	1298.96	394.23	3.29	0.052	0.013	1.30



Maximum Load: 1298.96 lbf
Total Strain: 1.30%
Unconfined Compressive Strength: 394 psi

Unconfined Compressive Strength Test

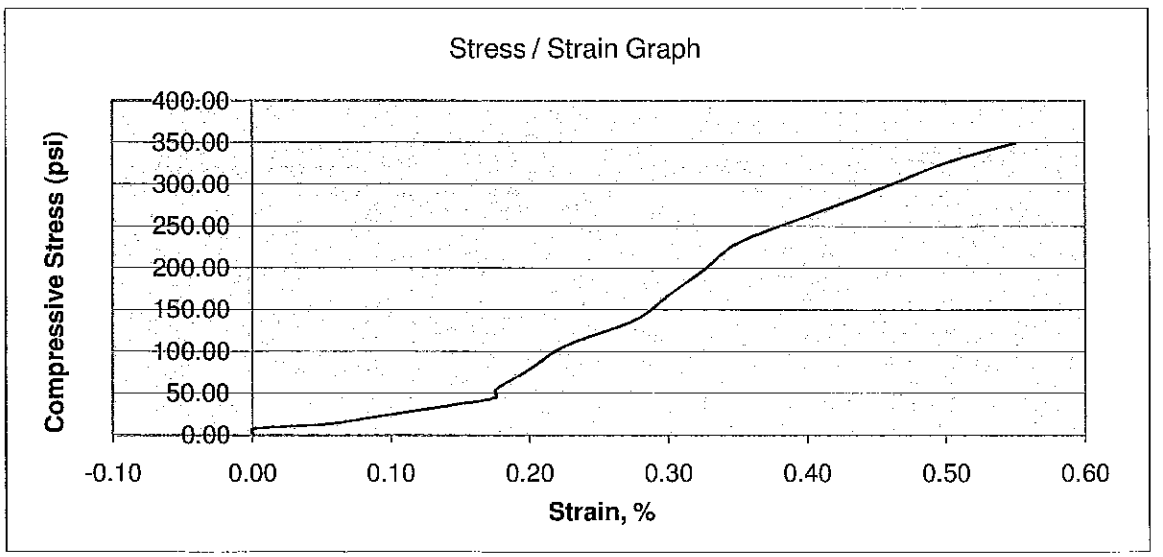
Client: Severstal Steel
Sample I.D.: 66%-20% PC
Cure Period: Day 28

Date:11/16/09
Proving Ring No.: 26266
Technician: CJ / NAO'S

	Millimeters	Inches
Cylinder Height:	101.7	4.00
Cylinder Diameter:	51.7	2.04
Cylinder Radius:	25.85	1.02

Strain Rate: 1 %/min

Load - Dial Reading	Load (lbf)	Compressive Stress (psi)	Average Cross-sectional Area (in2)	Deformation Dial Reading	Axial Strain (in.)	Axial Strain, %
0	0.00	0.00	3.25	0.000	0	0.00
10	26.52	8.15	3.25	0.000	0.000	0.00
18	43.04	13.23	3.25	0.002	0.000	0.05
27	61.63	18.94	3.25	0.003	0.001	0.07
37	82.29	25.28	3.26	0.004	0.001	0.10
47	102.95	31.61	3.26	0.005	0.001	0.12
57	123.60	37.95	3.26	0.006	0.001	0.15
69	148.39	45.55	3.26	0.007	0.002	0.17
84	179.38	55.06	3.26	0.007	0.002	0.17
123	259.94	79.77	3.26	0.008	0.002	0.20
166	348.76	107.00	3.26	0.009	0.002	0.22
215	449.98	137.98	3.26	0.011	0.003	0.27
263	549.13	168.34	3.26	0.012	0.003	0.30
310	646.21	198.05	3.26	0.013	0.003	0.32
361	751.56	230.28	3.26	0.014	0.003	0.35
412	856.91	262.43	3.27	0.016	0.004	0.40
461	958.13	293.28	3.27	0.018	0.004	0.45
513	1065.54	326.00	3.27	0.020	0.005	0.50
551	1144.04	349.84	3.27	0.022	0.005	0.55



Maximum Load: 1144.04 lbf
Total Strain: 0.55%
Unconfined Compressive Strength: 350 psi

Unconfined Compressive Strength Test

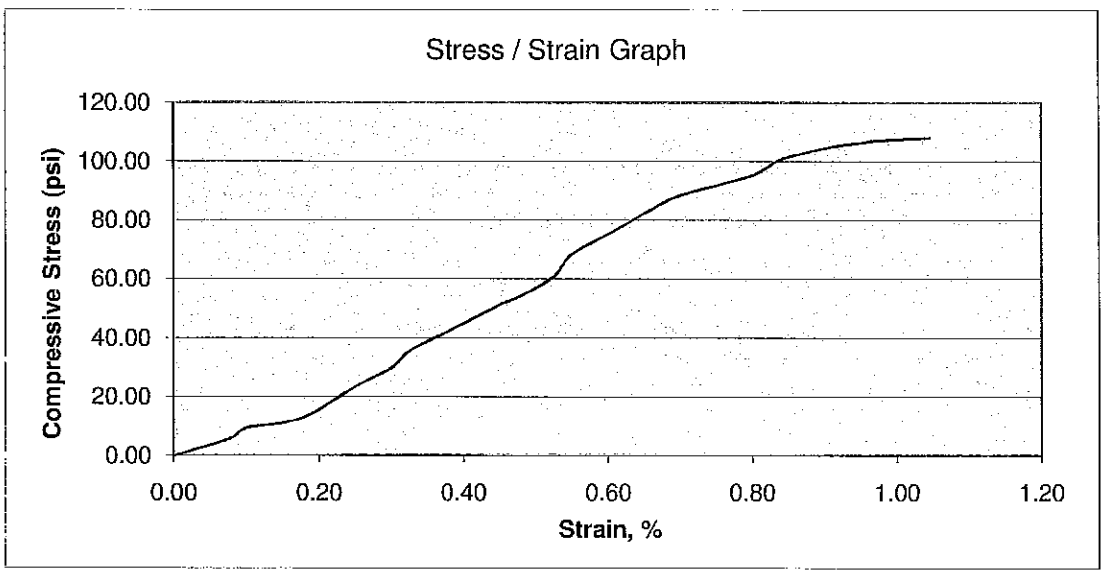
Client: Severstal Steel
Sample I.D.: 69%-10% PC
Cure Period: Day 28

Date:11/16/09
Proving Ring No.: 26266
Technician: CJ / NAO'S

	Millimeters	Inches
Cylinder Height:	102.1	4.02
Cylinder Diameter:	51.7	2.04
Cylinder Radius:	25.85	1.02

Strain Rate: 1 %/min

Load - Dial Reading	Load (lbf)	Compressive Stress (psi)	Average Cross-sectional Area (in^2)	Deformation Dial Reading	Axial Strain (in.)	Axial Strain, %
0	0.00	0.00	3.25	0	0	0.00
6	18.25	5.61	3.25	0.003	0.001	0.07
12	30.65	9.41	3.26	0.004	0.001	0.10
17	40.98	12.58	3.26	0.007	0.002	0.17
34	76.09	23.34	3.26	0.010	0.002	0.25
44	96.75	29.66	3.26	0.012	0.003	0.30
53	115.34	35.35	3.26	0.013	0.003	0.32
63	136.00	41.66	3.26	0.015	0.004	0.37
78	166.98	51.11	3.27	0.018	0.004	0.45
82	175.24	53.63	3.27	0.019	0.005	0.47
93	197.97	60.55	3.27	0.021	0.005	0.52
105	222.75	68.12	3.27	0.022	0.005	0.55
116	245.48	75.03	3.27	0.024	0.006	0.60
127	268.20	81.93	3.27	0.026	0.006	0.65
137	288.86	88.20	3.28	0.028	0.007	0.70
148	311.58	95.04	3.28	0.032	0.008	0.80
158	332.23	101.29	3.28	0.034	0.008	0.85
166	348.76	106.22	3.28	0.038	0.009	0.95
169	354.96	108.00	3.29	0.042	0.010	1.04



Maximum Load: 354.96 lbf
Total Strain: 1.04%
Unconfined Compressive Strength: 108 psi

Unconfined Compressive Strength Test

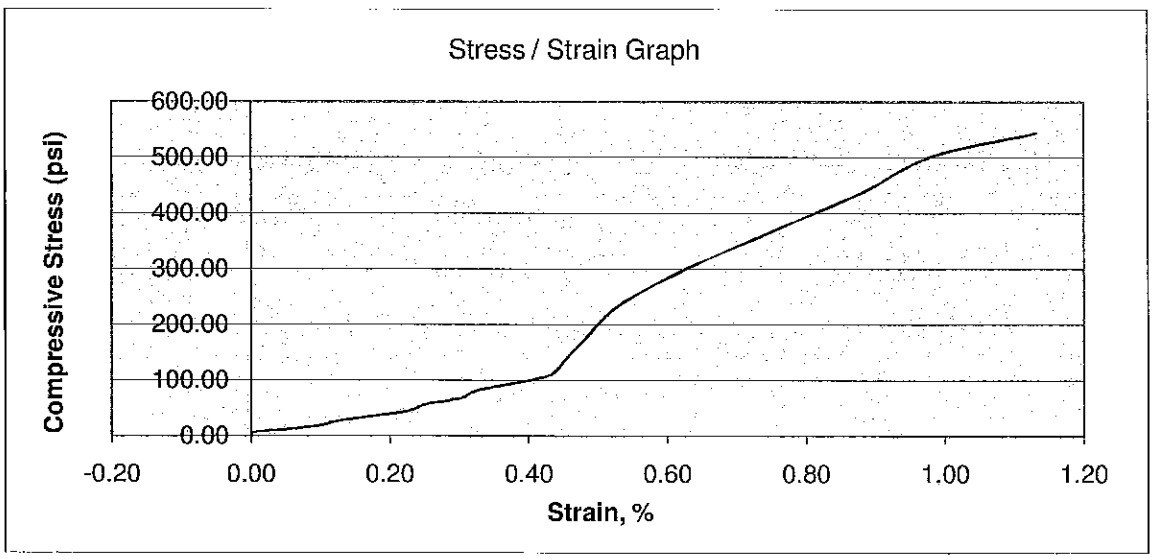
Client: Severstal Steel
Sample I.D.: 69%-15% PC
Cure Period: Day 28

Date:11/16/09
Proving Ring No.: 26266
Technician: CJ / NAO'S

	Millimeters	Inches
Cylinder Height:	101.2	3.98
Cylinder Diameter:	51.0	2.01
Cylinder Radius:	25.5	1.00

Strain Rate: 1 %/min

Load - Dial Reading	Load (lbf)	Compressive Stress (psi)	Average Cross-sectional Area (in2)	Deformation Dial Reading	Axial Strain (in.)	Axial Strain, %
0	0.00	0.00	3.16	0.000	0	0.00
4	14.12	4.46	3.16	0.000	0.000	0.00
8	22.39	7.07	3.16	0.000	0.000	0.00
13	32.71	10.33	3.17	0.001	0.000	0.03
17	40.98	12.94	3.17	0.002	0.001	0.05
29	65.76	20.76	3.17	0.004	0.001	0.10
41	90.55	28.58	3.17	0.005	0.001	0.13
54	117.41	37.03	3.17	0.007	0.002	0.18
68	146.32	46.13	3.17	0.009	0.002	0.23
86	183.51	57.84	3.17	0.010	0.003	0.25
103	218.62	68.87	3.17	0.012	0.003	0.30
125	264.07	83.17	3.18	0.013	0.003	0.33
165	346.69	109.08	3.18	0.017	0.004	0.43
210	439.65	138.29	3.18	0.018	0.005	0.45
260	542.93	170.74	3.18	0.019	0.005	0.48
357	743.30	233.63	3.18	0.021	0.005	0.53
462	960.19	301.50	3.18	0.025	0.006	0.63
568	1179.15	369.78	3.19	0.030	0.008	0.75
673	1396.05	437.25	3.19	0.035	0.009	0.88
774	1604.68	502.08	3.20	0.039	0.010	0.98
841	1743.08	544.56	3.20	0.045	0.011	1.13



Maximum Load: 1743.08 lbf
Total Strain: 1.13%
Unconfined Compressive Strength: 545 psi

Unconfined Compressive Strength Test

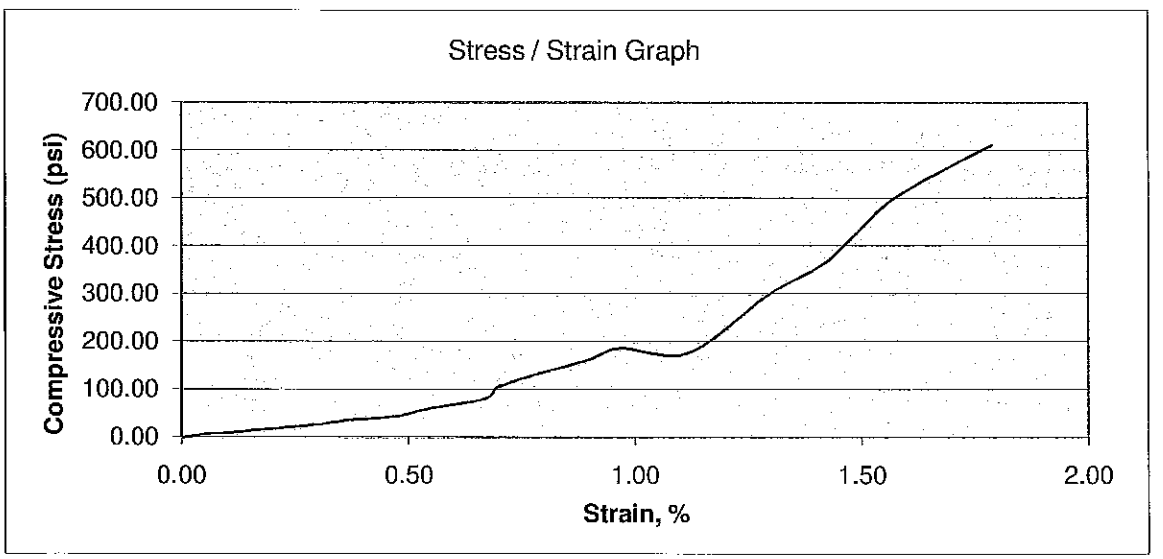
Client: Severstal Steel
Sample I.D.: 69%-20% PC
Cure Period: Day 28

Date:11/16/09
Proving Ring No.: 26266
Technician: CJ / NAO'S

	Millimeters	Inches
Cylinder Height:	102.4	4.03
Cylinder Diameter:	52.3	2.06
Cylinder Radius:	26.15	1.03

Strain Rate: 1 %/min

Load - Dial Reading	Load (lbf)	Compressive Stress (psi)	Average Cross-sectional Area (in2)	Deformation Dial Reading	Axial Strain (in.)	Axial Strain, %
0	0.00	0.00	3.33	0.000	0	0.00
3	12.06	3.62	3.33	0.001	0.000	0.02
9	24.45	7.34	3.33	0.002	0.000	0.05
16	38.91	11.68	3.33	0.005	0.001	0.12
24	55.44	16.63	3.33	0.007	0.002	0.17
34	76.09	22.81	3.34	0.010	0.002	0.25
46	100.88	30.21	3.34	0.013	0.003	0.32
57	123.60	37.00	3.34	0.015	0.004	0.37
69	148.39	44.38	3.34	0.019	0.005	0.47
96	204.16	61.01	3.35	0.022	0.005	0.55
130	274.40	81.89	3.35	0.027	0.007	0.67
167	350.83	104.68	3.35	0.028	0.007	0.69
207	433.45	129.24	3.35	0.031	0.008	0.77
260	542.93	161.68	3.36	0.036	0.009	0.89
301	627.62	186.76	3.36	0.039	0.010	0.97
286	596.64	177.27	3.37	0.045	0.011	1.12
482	1001.51	297.04	3.37	0.052	0.013	1.29
590	1224.60	362.75	3.38	0.057	0.014	1.41
698	1447.69	428.51	3.38	0.060	0.015	1.49
807	1672.85	494.78	3.38	0.063	0.016	1.56
920	1906.27	563.11	3.39	0.068	0.017	1.69
1000	2071.52	611.31	3.39	0.072	0.018	1.79



Maximum Load: 2071.52 lbf
Total Strain: 1.79%
Unconfined Compressive Strength: 611 psi

Unconfined Compressive Strength Test

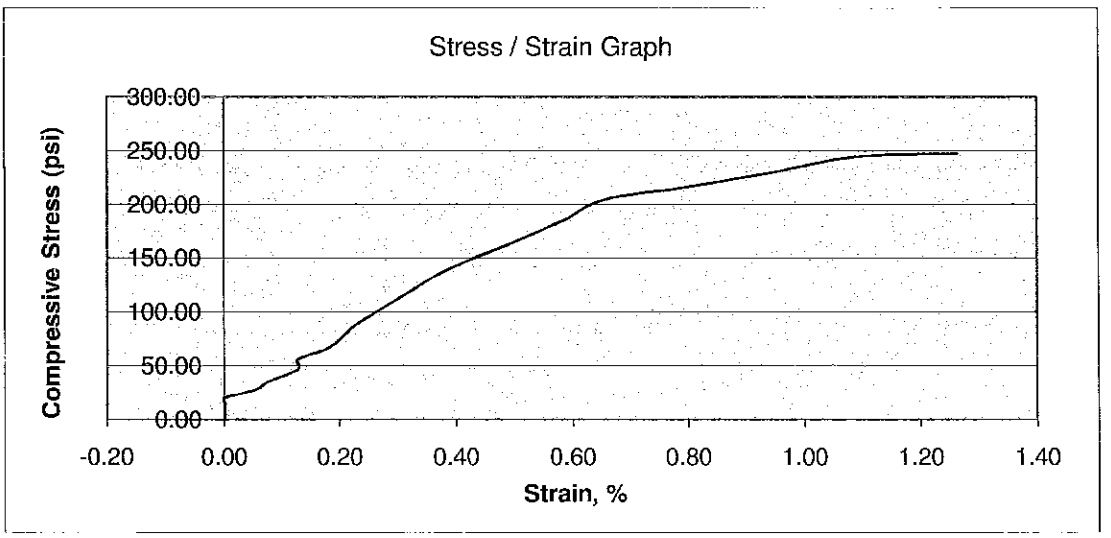
Client: Severstal Steel
Sample I.D.: 72%-10% PC
Cure Period: Day 28

Date:11/16/09
Proving Ring No.: 26266
Technician: CJ / NAO'S

	Millimeters	Inches
Cylinder Height:	100.7	3.96
Cylinder Diameter:	52.0	2.05
Cylinder Radius:	26	1.02

Strain Rate: 1 %/min

Load - Dial Reading	Load (lbf)	Compressive Stress (psi)	Average Cross-sectional Area (in2)	Deformation Dial Reading	Axial Strain (in.)	Axial Strain, %
0	0.00	0.00	3.29	0.000	0	0.00
21	49.24	14.97	3.29	0.000	0.000	0.00
30	67.83	20.62	3.29	0.000	0.000	0.00
41	90.55	27.51	3.29	0.002	0.001	0.05
54	117.41	35.66	3.29	0.003	0.001	0.08
72	154.59	46.93	3.29	0.005	0.001	0.13
87	185.57	56.33	3.29	0.005	0.001	0.13
103	218.62	66.33	3.30	0.007	0.002	0.18
120	253.74	76.97	3.30	0.008	0.002	0.20
139	292.99	88.85	3.30	0.009	0.002	0.23
179	375.61	113.82	3.30	0.012	0.003	0.30
218	456.17	138.13	3.30	0.015	0.004	0.38
255	532.60	161.11	3.31	0.019	0.005	0.48
293	611.10	184.66	3.31	0.023	0.006	0.58
326	679.27	205.10	3.31	0.026	0.007	0.66
346	720.58	217.25	3.32	0.032	0.008	0.81
370	770.15	231.84	3.32	0.038	0.010	0.96
391	813.53	244.59	3.33	0.043	0.011	1.08
397	825.93	247.87	3.33	0.050	0.013	1.26



Maximum Load: 825.93 lbf
Total Strain: 1.26%
Unconfined Compressive Strength: 248 psi

Unconfined Compressive Strength Test

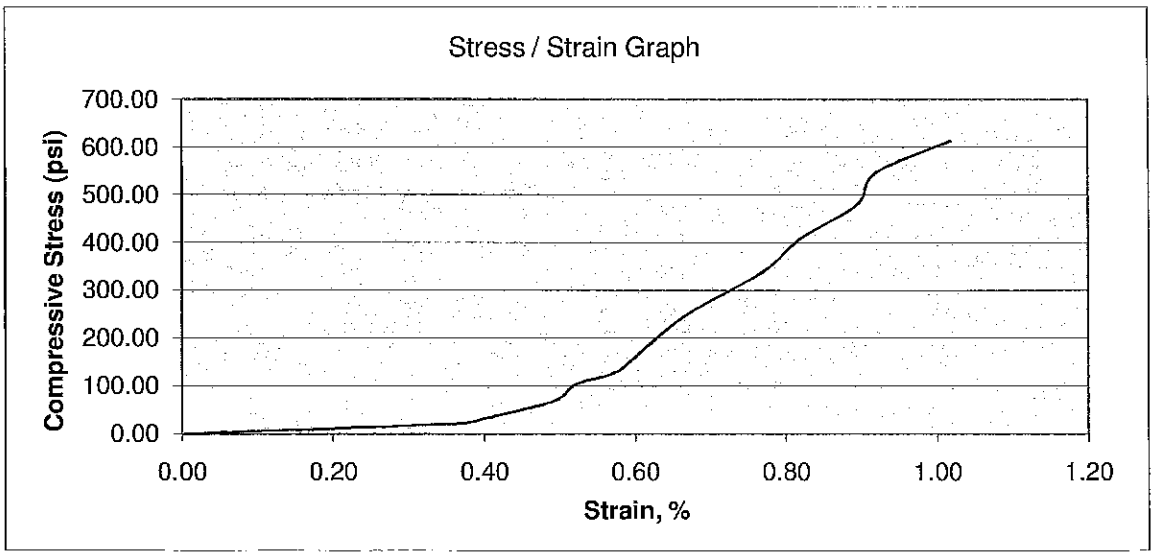
Client: Severstal Steel
Sample I.D.: 72%-15% PC
Cure Period: Day 28

Date:11/16/09
Proving Ring No.: 26266
Technician: CJ / NAO'S

	Millimeters	Inches
Cylinder Height:	102.4	4.03
Cylinder Diameter:	52.3	2.06
Cylinder Radius:	26.15	1.03

Strain Rate: 1 %/min

Load - Dial Reading	Load (lbf)	Compressive Stress (psi)	Average Cross-sectional Area (in2)	Deformation Dial Reading	Axial Strain (in.)	Axial Strain, %
0	0.00	0.00	3.33	0.000	0	0.00
3	12.06	3.62	3.33	0.002	0.000	0.05
8	22.39	6.72	3.33	0.004	0.001	0.10
13	32.71	9.81	3.33	0.007	0.002	0.17
19	45.11	13.52	3.34	0.009	0.002	0.22
26	59.57	17.84	3.34	0.012	0.003	0.30
35	78.16	23.40	3.34	0.015	0.004	0.37
49	107.08	32.05	3.34	0.016	0.004	0.40
79	169.05	50.57	3.34	0.018	0.004	0.45
115	243.41	72.77	3.34	0.020	0.005	0.50
167	350.83	104.86	3.35	0.021	0.005	0.52
204	427.25	127.64	3.35	0.023	0.006	0.57
250	522.27	155.99	3.35	0.024	0.006	0.60
307	640.02	191.11	3.35	0.025	0.006	0.62
407	846.58	252.67	3.35	0.027	0.007	0.67
550	1141.97	340.49	3.35	0.031	0.008	0.77
662	1373.33	409.26	3.36	0.033	0.008	0.82
777	1610.88	479.69	3.36	0.036	0.009	0.89
886	1836.03	546.60	3.36	0.037	0.009	0.92
996	2063.26	613.64	3.36	0.041	0.010	1.02



Maximum Load: 2063.26 lbf
Total Strain: 1.02%
Unconfined Compressive Strength: 614 psi

Unconfined Compressive Strength Test

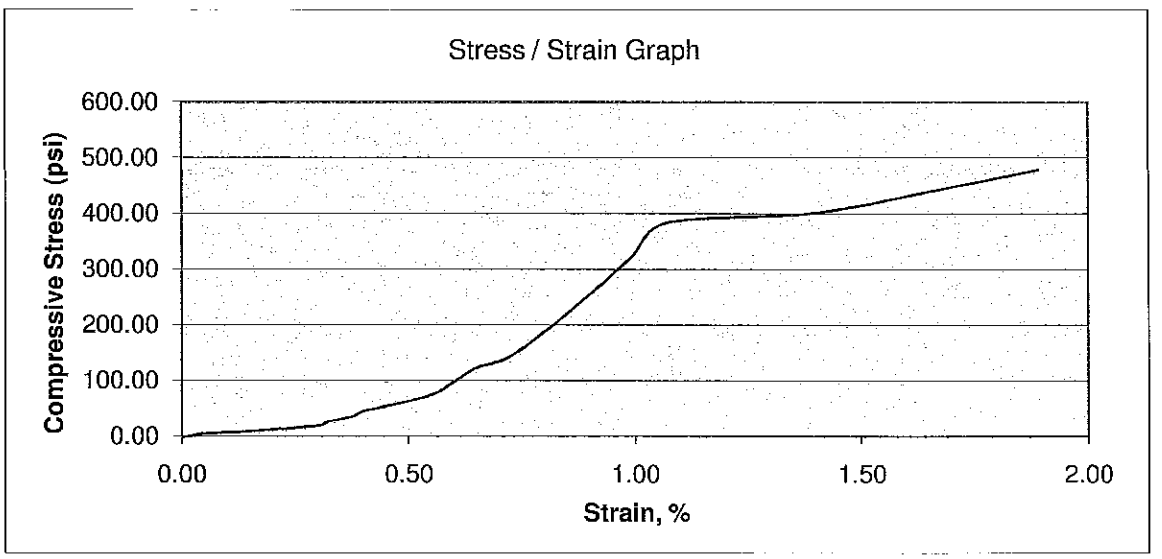
Client: Severstal Steel
Sample I.D.: 72%-20% PC
Cure Period: Day 28

Date:11/16/09
Proving Ring No.: 26266
Technician: CJ / NAO'S

	Millimeters	Inches
Cylinder Height:	102.3	4.03
Cylinder Diameter:	52.2	2.06
Cylinder Radius:	26.1	1.03

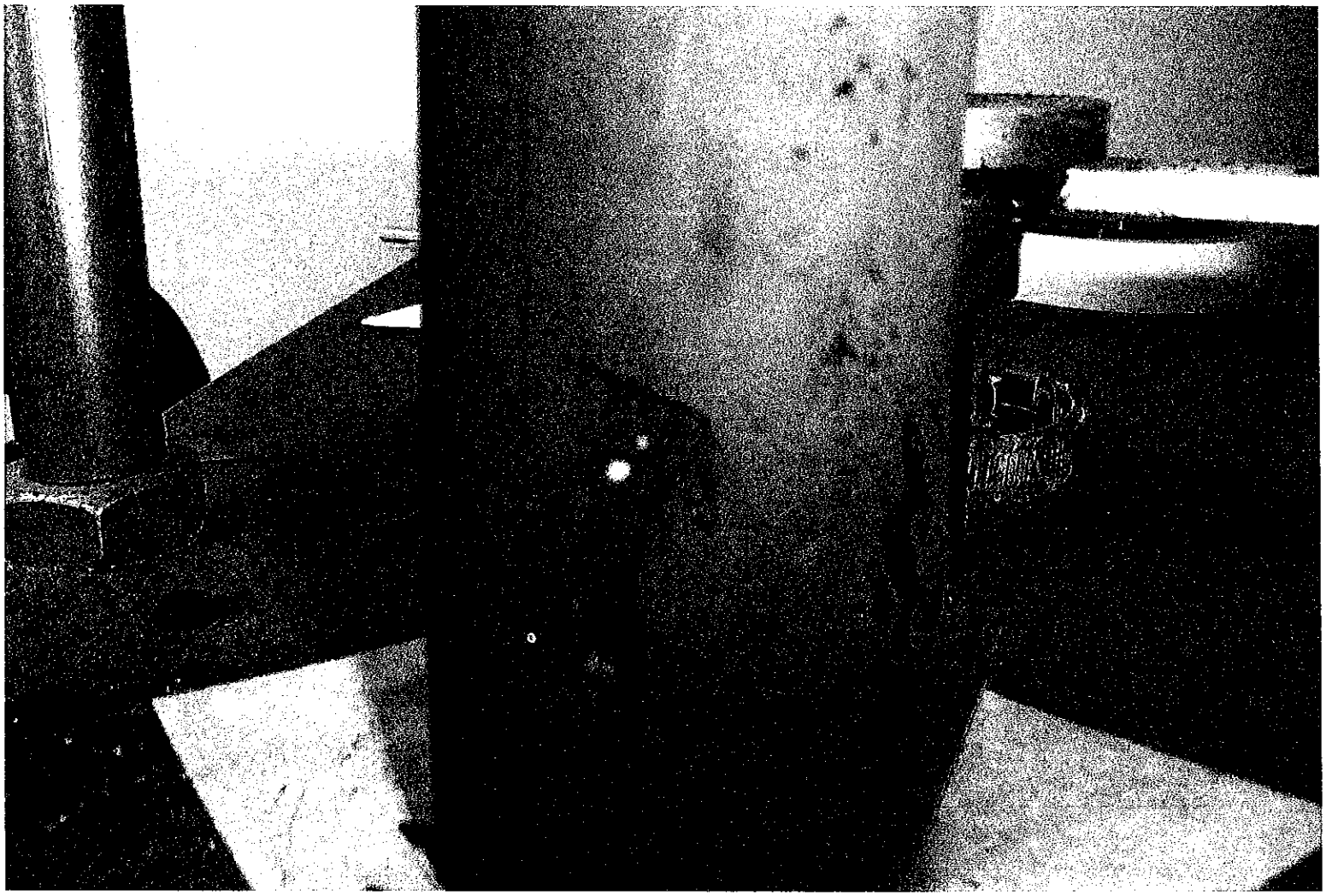
Strain Rate: 1 %/min

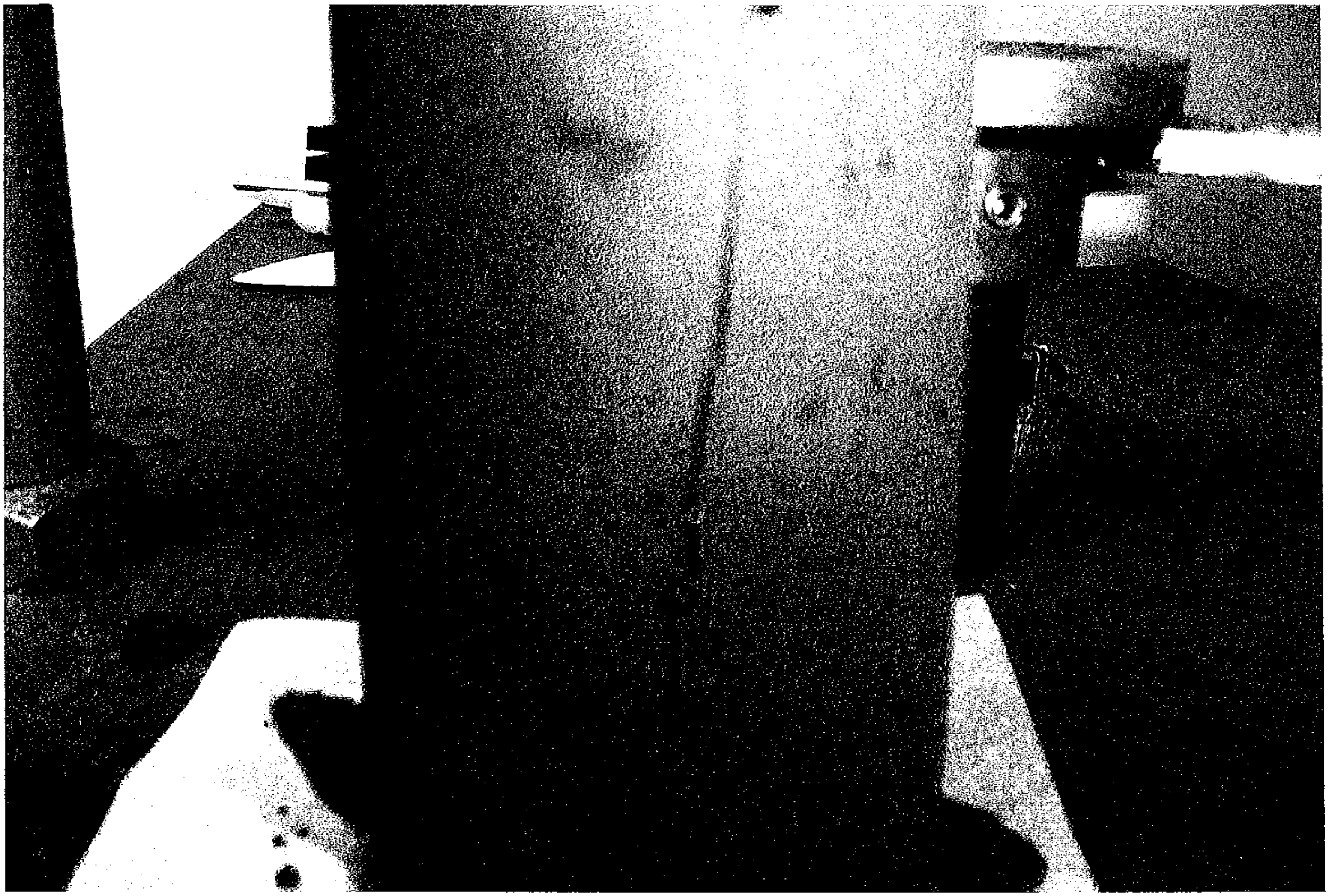
Load - Dial Reading	Load (lbf)	Compressive Stress (psi)	Average Cross-sectional Area (in2)	Deformation Dial Reading	Axial Strain (in.)	Axial Strain, %
0	0.00	0.00	3.32	0.000	0	0.00
6	18.25	5.50	3.32	0.002	0.000	0.05
11	28.58	8.61	3.32	0.005	0.001	0.12
18	43.04	12.96	3.32	0.008	0.002	0.20
29	65.76	19.78	3.33	0.012	0.003	0.30
42	92.62	27.85	3.33	0.013	0.003	0.32
54	117.41	35.28	3.33	0.015	0.004	0.37
70	150.46	45.20	3.33	0.016	0.004	0.40
85	181.44	54.48	3.33	0.018	0.004	0.45
117	247.54	74.26	3.33	0.022	0.005	0.55
154	323.97	97.13	3.34	0.024	0.006	0.60
196	410.73	123.08	3.34	0.026	0.006	0.65
229	478.90	143.40	3.34	0.029	0.007	0.72
325	677.20	202.58	3.34	0.033	0.008	0.82
435	904.42	270.28	3.35	0.037	0.009	0.92
525	1090.33	325.60	3.35	0.040	0.010	0.99
620	1286.57	383.91	3.35	0.043	0.011	1.07
650	1348.54	401.09	3.36	0.056	0.014	1.39
712	1476.61	438.07	3.37	0.066	0.016	1.64
780	1617.07	478.54	3.38	0.076	0.019	1.89



Maximum Load: 1617.07 lbf
Total Strain: 1.89%
Unconfined Compressive Strength: 479 psi

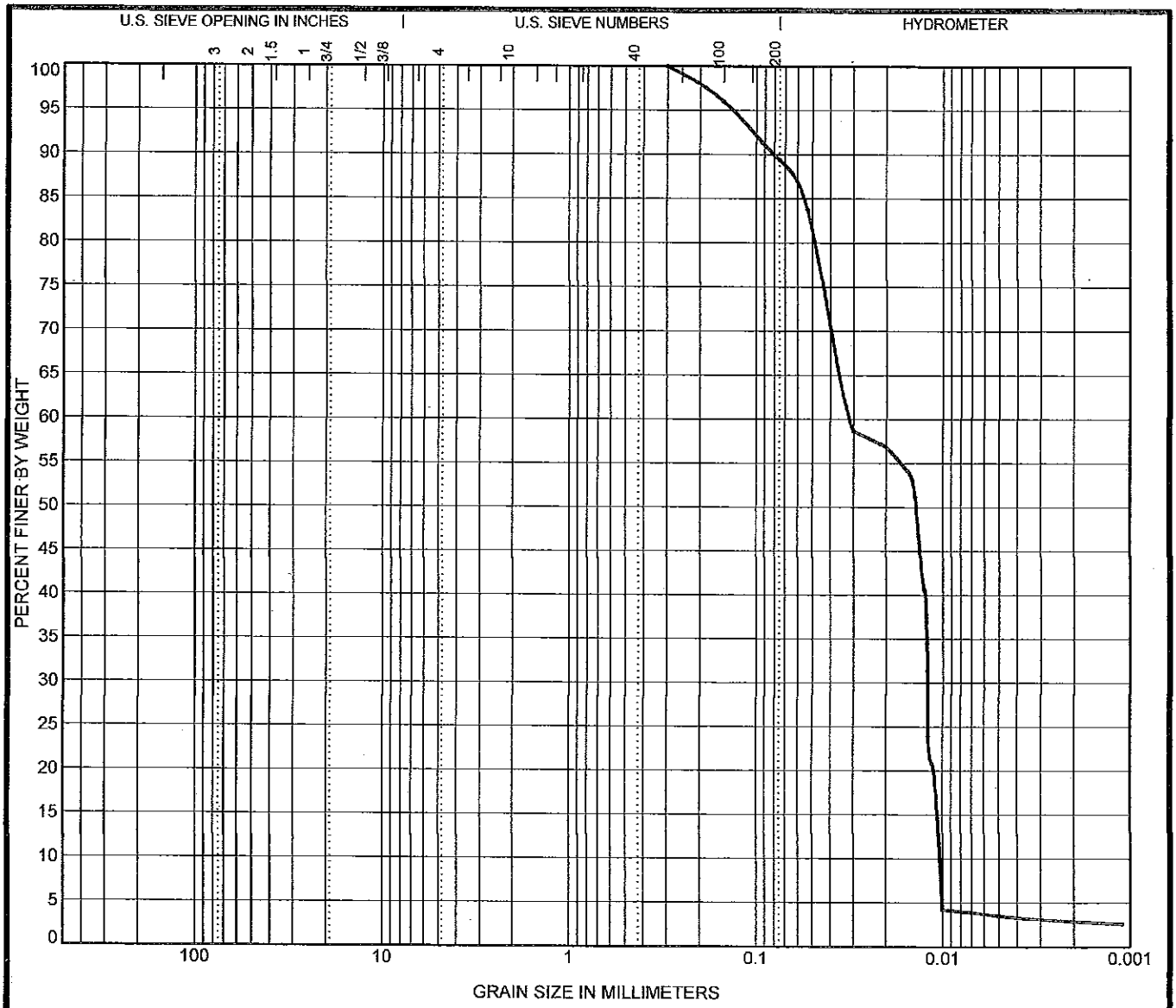
Mold had significant cracks throughout at this point. However, test was continued until the load dial reading began to drop.





Geo-Technology Associates, Inc.

Raw Data



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
● BOF 121109 0.0-		21	17	4	0.45	2.95
12/16/2009						
USCS Classification	SILTY CLAY(CL-ML)					
Natural Moisture	49.3					

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● BOF 121109 0.0-	0.3	0.031	0.012	0.01	0.0	10.6	85.9	3.5

ASTM Specifications Performed May Include: D421, D422, D2216, D2217, D4318

Geo-Technology Associates, Inc.
18 Boulden Circle, Suite 36
New Castle, Delaware 19720
Telephone: 302-326-2100
Fax: 302-326-2399

GRAIN SIZE DISTRIBUTION

Project: BOF Filter Cake-Severstal Steel

Location: Baltimore, Maryland

Number: 090961

GSA 070229.GPJ US_LAB.GDT 12/28/09

Grain Size Distribution

Sieve Size	Percent Finer
3 in.(75mm)	---
2 in.(50mm)	---
1.5 in.(37.5mm)	---
1 in.(25mm)	---
0 .75 in.(19mm)	---
0 .5 in.(12.5mm)	---
0.375 in.(9.5mm)	---
No. 4(4.75mm)	---
No. 8(2.36mm)	---
No. 10(2mm)	---
No. 16(1.18mm)	---
No. 30(.600mm)	---
No. 40(.425mm)	---
No. 50(.297mm)	100.0
No. 100(.150mm)	96.0
No. 200(.075mm)	89.4

D_{100} =	0.3
D_{60} =	0.0
D_{30} =	0.0
D_{10} =	0.0
C_c =	0.5
C_u =	3.0
% Gravel =	0.0
% Sand =	10.6
% Silt/Clay =	89.4

USCS		CL-ML
Natural Moisture Content		49.3%
Atterberg Limits:	Liquid Limit =	21.0%
	Plastic Limit =	17.0%
Estimated Dry Density		130 to 135 pcf
Estimated Optimum Moisture Content		22 to 28%

Sample Source: **Severstal Steel**

Sample Number: **BOF Filter Cake with 15% cement by dry weight**

Geo-Technology Associates, Inc.
18 Boulden Circle, Suite 36
New Castle, Delaware 19720
Telephone: (302) 326-2100
Fax: (302) 326-2399

Laboratory Testing Summary

Project: BOF Filter Cake-Severstal Steel

Location: Baltimore, Maryalnd

Number: 090961

APPENDIX B RELEASE REPORTING RECORDS

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Severstal
International

May 15, 2009

CERTIFIED RETURN RECEIPT REQUESTED

Mr. Greg Sonberg
Maryland Department of the Environment
Oil Control Program
1800 Washington Boulevard Suite 620
Baltimore, Maryland 21230-1708

Dear Mr. Sonberg:

This letter will serve as the spill report for Severstal Sparrows Point, LLC for the Month of April, 2009. There was one spill which occurred during April and the spill report was sent to you on April 24, 2009.

If there are questions please refer them to Joe Dolan, of my staff, at 410-388-5991.

Sincerely,

Robert J. Abate
Division Manager
Environmental Engineering and Affairs

Attachment

CC: EPA OPA Book
ISO 14000 CFT Members
Plant Maintenance Supervisors

Severstal Sparrows Point
1430 Sparrows Point Blvd.
Sparrows Point, MD 21219 USA

T: (410)388-6548
F: (410) 388-6629
E: Bob.Abate@severstalna.com

Severstal
International

April 24, 2009

CERTIFIED RETURN RECEIPT REQUESTED

Mr. Greg Sonberg
Maryland Department of the Environment
Oil Control Program
1800 Washington Boulevard Suite 620
Baltimore, Maryland 21230-1708

Dear Mr. Sonberg:

This letter will provide the details regarding the fifty gallon diesel fuel spill that occurred at our Slab Hauler Repair Shop on April 15, 2009. The Slab Hauler Repair Shop is owned by Severstal but is operated by Kinder Morgan.

At approximately 1450 hours Environmental affairs received notice that a diesel fuel spill had occurred at the Slab Hauler Repair Facility located in the center of the plant. Environmental Affairs responded and found approximately fifty gallons of diesel fuel contained within a depressed area just outside of the diesel fuel storage tank dike. No sewers or bodies of water were impacted. Shop employees were observed using buckets to collect the oil and place it in drums. As it was raining heavily at the time, and the water was also collecting in the depressed area, a vacuum truck was summoned from Mobile Dredging and Pumping to remove the collected diesel fuel and water and to also empty the drums. Subsequent to the liquid removal a payloader was dispatched to the area to remove the contaminated soil in the depressed area.

The liquid material was taken to Kroff Materials Processing for recycling. The contaminated soil was also taken to Kroff for stabilization and subsequent transfer to our onsite landfill.

Our investigation of the incident found that the spill resulted from the improper fueling of a slab hauler machine and a failure of a safety device to work properly. It was determined that during a refueling operation on a slab hauler the hauler was left unattended and when the Kinder Morgan employee returned to the vehicle he found that the fuel tank had overflowed. The dispenser nozzle was inspected and it was found that the automatic shutoff did not function properly and allowed fuel to continue to flow after the tank was full.

To prevent a recurrence the following activities have been or will be done.

- The dispenser and pump island have been marked with decals that remind individuals that vehicles are to be attended while being fueled.
- All employees who work at the Slab Hauler Repair Shop have been informed about the circumstances regarding the spill and the need to attend vehicles while they are being fueled.
- Other employees who fuel vehicles will also be made aware of the circumstances surrounding this spill.
- The malfunctioning diesel fuel dispenser nozzle has been replaced.
- The diesel fuel dispenser nozzles will be tested daily to ensure that they work properly.

Sincerely,

Robert J. Abate
Division Manager
Environmental Engineering and Affairs

cc: EPA OPA Book
ISO14000 CFT Members
Plant Maintenance Supervisors

Severstal Sparrows Point
1430 Sparrows Point Blvd.
Sparrows Point, MD 21219 USA

T: (410)388-6548
F: (410) 388-6529
E: Bob.Abate@severstalna.com

Severstal
International

August 7, 2009

CERTIFIED RETURN RECEIPT REQUESTED

Mr. Greg Sonberg
Maryland Department of the Environment
Oil Control Program
1800 Washington Boulevard Suite 620
Baltimore, Maryland 21230-1708

Dear Mr. Sonberg:

This letter will serve as the spill report for Severstal Sparrows Point, LLC for the Month of July, 2009. There was one spill that occurred during the month and details are attached.

If there are questions please refer them to Joe Dolan, of my staff, at 410-388-5991.

Sincerely,

Robert J. Abate
Division Manager
Environmental Engineering and Affairs

Attachment

CC: EPA OPA Book
ISO 14000 CFT Members
Plant Maintenance Supervisors

Severstal Sparrows Point
1430 Sparrows Point Blvd.
Sparrows Point, MD 21219 USA

T: (410)388-6548
F: (410) 388-6529
E: Bob.Abate@severstalna.com

Mr. Greg Sonberg - August 7, 2009

Date and Time – July 29, 2009 at approximately 1025 hours

Amount Spilled – Approximately 10 gallons

Spilled To – Ground

Material Spilled – Hydraulic oil

Location – Near Truck Dock 14 Hot Strip Mill Area

MDE Contacted – Terry Haney on 7/29/09 at 1103 hours.

On July 29, 2009 tractor 2590 was transferring hot bands in the vicinity of Truck Dock 14, in the Hot Strip Mill, area when a hydraulic hose burst. The operator immediately drove the tractor off of the roadway, took the tractor out of service, and summoned help. All of the spilled oil was contained on the ground beneath the tractor and on the roadway nearby. None entered any sewers or bodies of water.

Mobile Dredging and Pumping was summoned to the scene to do the cleanup. The contaminated soil was removed by a vactor truck and the roadway was pressure washed with the water/oil mixture also recovered by the vactor. Upon completion of the job the recovered materials were taken to Kroff Materials Handling for stabilization and later disposal at our plant landfill.

Inspection of the area after Mobile Dredging had finished showed that the vactor was not able to remove all of the contaminated soil due the hard packing of the slag in the area. A Grade-All and dump truck were summoned from our Mobile Equipment and Yards Department and they completed the cleanup task. That soil was taken to our plant landfill for disposal.

The tractor has been inspected, repaired, tested, and placed back into service.

Severstal
International

September 30, 3009

CERTIFIED RETURN RECEIPT REQUESTED

Mr. Greg Sonberg
Maryland Department of the Environment
Oil Control Program
1800 Washington Boulevard Suite 620
Baltimore, Maryland 21230-1708

Dear Mr. Sonberg:

This letter will serve as the spill report for Severstal Sparrows Point, LLC for the Month of August, 2009. There was one spill that occurred during the month and details are attached.

If there are questions please refer them to Joe Dolan, of my staff, at 410-388-5991.

Sincerely,

Robert J. Abate
Division Manager
Environmental Engineering and Affairs

Attachment

CC: EPA OPA Book
ISO 14000 CFT Members
Plant Maintenance Supervisors

Severstal Sparrows Point
1430 Sparrows Point Blvd.
Sparrows Point, MD 21219 USA

T: (410)388-6548
F: (410) 388-6529
E: Bob.Abate@severstalna.com

Mr. Greg Sonberg – September 30, 2009

Date and Time – August 15, 2009 at approximately 1000 hours

Amount Spilled – Approximately 40 gallons

Spilled To – Ground

Material Spilled – Hydraulic oil (Paradene 40)

Location – Near Conveyor D3A

MDE Contacted – Becky on 8/15/09 at 1020 hours.

On August 15, 2009 Loader 4278 was working in the area of D3A conveyor when a hydraulic hose ruptured. When the operator noticed the leak he immediately shut down the machine and called for help. Approximately 40 gallons of Paradene 40 hydraulic fluid was spilled to the ground. No sewers or waterways were impacted.

Repair forces responded, inspected the unit, replaced the ruptured hose, tested the repair, and placed the loader back into service. The contaminated soil was subsequently removed and placed into our onsite landfill.

Severstal
International

November 25, 2009

CERTIFIED RETURN RECEIPT REQUESTED

Mr. Greg Sonberg
Maryland Department of the Environment
Oil Control Program
1800 Washington Boulevard Suite 620
Baltimore, Maryland 21230-1708

Dear Mr. Sonberg:

This letter, and its attachment, will serve as the spill report for Severstal Sparrows Point, LLC for the Month of October, 2009. There was one spill during the month.

If there are questions please refer them to Joe Dolan, of my staff, at 410-388-5991.

Sincerely,

Russell Becker
Manager, Environmental Programs
Environmental Engineering and Affairs

Attachment

CC: EPA OPA Book
ISO 14000 CFT Members
Plant Maintenance Supervisors

Severstal Sparrows Point
1430 Sparrows Point Blvd.
Sparrows Point, MD 21219 USA

T: (410)388-6548
F: (410) 388-6529
E: Bob.Abate@severstalna.com

Mr. Greg Sonberg – November 25, 2009

Date and Time – October 29, 2009 at approximately 1500 hours

Amount Spilled – Approximately 15 gallons

Spilled To – Ground

Material Spilled – Hydraulic fluid (Quintolubric)

Location – Below L Furnace Stove Platform

MDE Contacted – Art Mayfield on October 29, 2009 at 1545 hours.

On October 29, 2009 a hydraulic hose, carrying Quintolubric hydraulic fluid, burst in the hydraulic pump room on the L Blast Furnace Stove Platform. All fluid that exits the system, inside of the hydraulic room, flows to a drain that is piped to a holding tank on the ground below the stove platform.

Investigation revealed that the piping between the floor drain and the tank leaked and spilled fluid to the concrete pad below the stove platform. Approximately fifteen gallons of fluid flowed off of the concrete and came to rest on the soil next to the pad. No sewers or water bodies were affected.

Mobile Dredging and Pumping was called to the area to affect the cleanup. They removed the contaminated soil and cleaned the spilled fluid off of the concrete. Plant repair forces have, subsequently, repaired the piping and replaced the holding tank.

Severstal
International

December 22, 2009

CERTIFIED RETURN RECEIPT REQUESTED

Mr. Greg Sonberg
Maryland Department of the Environment
Oil Control Program
1800 Washington Boulevard Suite 620
Baltimore, Maryland 21230-1708

Dear Mr. Sonberg:

This letter, and its attachment, will serve as the spill report for Severstal Sparrows Point, LLC for the Month of November, 2009. There was one spill incident reported during the month that upon investigation was found not to be the fault of Severstal. See the attachment for further details.

If there are questions please refer them to Joe Dolan, of my staff, at 410-388-5991.

Sincerely,

Russell Becker
Division Manager
Environmental Engineering and Affairs

Attachment

CC: EPA OPA Book
ISO 14000 CFT Members
Plant Maintenance Supervisors

Severstal Sparrows Point
1430 Sparrows Point Blvd.
Sparrows Point, MD 21219 USA

T: (410)388-6622
F: (410) 388-6529
E: russ.becker@severstalna.com

Mr. Greg Sonberg – December 22, 2009

Date and Time – November 11, 2009. Discovered at approximately 0900 hours.

Amount Spilled – Oil sheen

Spilled To – Water

Material Spilled – Unknown

Location – Coal Dock Basin

MDE Contacted – Valerie Green at 1025 hours on 11/11/09

On November 11, 2009, at approximately 0900 hours, a sheen of an unknown type of oil was discovered at the Coal Dock Basin by plant personnel during their routine rounds. Plant environmental personnel were immediately contacted and began an investigation.

Upon arrival at the location the sheen was verified as reported and was contained within the Coal Dock Basin. There was no evidence of any oil found within Outfall 012 which parallels the Coal Dock Basin. Nor did we find any evidence of problems aboard a tug boat docked within the basin. The owner of the tug was called to the scene and his vessel was boarded by environmental personnel. No evidence of fuel or lubricant leakage was evident nor was there any contamination observed within the vessel's bilge. A check of the surrounding shoreline for a source also turned up negative.

A2Z Environmental was called and was requested to respond with harbor booms and removal equipment. A2Z responded with the equipment requested and effected the cleanup. The harbor boom was not used as it was decided that sorbent sweeps were the better choice for the location.

Reports were made to the Maryland Department of the Environment, United States Coast Guard, and the National Response Center (NRC). The NRC gave the incident Case Number 923177. Coast Guard Petty Officers Lord-Flynn and Webb visited the site and conducted their own investigation during the cleanup. They determined that there was no visible source for the oil and labeled it a "phantom sheen". As a result they did not open an incident report and considered the matter closed.

Since no source was found for this oil Severstal claims no responsibility for the incident.