APPENDIX B

VANE SHEAR TESTING

GREGG DRILLING AND TESTING, INC.
GREGG IN SITU, INC.
ENVIRONMENTAL AND GEOTECHNICAL INVESTIGATION SERVICES

AUG 10 2005

August 5, 2005

Attn:
Mr. Robbie Warner
Geologic Associates
1360 Valley Vista, Ste. 100
Diamond Bar, California 94765

Subject: Field Vane Shear Test Results
NEWBY ISLAND LANDFILL
GREGG Project Number:

Dear Mr. Warner:

The following report presents the results of GREGG IN SITU's Field Vane Shear Testing Program for the above referenced site. The following testing services were performed:

1	Cone Penetration Tests	(CPTU)	☐
2	Pore Pressure Dissipation Tests	(PPD)	☐
3	Seismic Cone Penetration Tests	(SCPTU)	☐
4	Resistivity Cone Penetration Tests	(RCPTU)	☐
5	Pressuremeter Tests	(PMT)	☐
6	Groundwater Sampling	(GWS)	☐
7	Soil Sampling	(SS)	☐
8	Vapor Sampling	(VS)	☐
9	Field Vane Shear Testing	(FVST)	X
10	SPT Energy Calibration	(SPTE)	☐

Field vane shear testing was part of a drilling and sampling program conducted at various locations around the Newby Landfill in Milpitas California. Most testing was accomplished using a Envi MemoVane system. One test location was completed using a Geonor H-70 Vane Borer/Acker torque head system. Vane tests were conducted in 5 test locations. Rotary wash borings, extending through the garbage fill, were performed at each test location. The vane was pushed to the various test depths below the bottom of the boreholes using a Failing 1500 truck mounted drill rig.
A list of reference papers providing additional background on the specific tests conducted is provided in the bibliography following the text of the report. If you would like a copy of any of these publications or should you have any questions or comments regarding the contents of this report, please do not hesitate to contact our office at (925) 313-5800.

Sincerely,
GREGG IN SITU, Inc.
Virgil A. Baker
Geotechnical Manager

Field Vane Shear Testing Summary

-Table 1-

FVST Identification	Date	Test Depths (Feet)	Comments
RB-10v & RB-10Va	7/6,7,13,14/05	26.6, 27.6, 39.0,46.0, 65.5, 80.0	
RB-11V	7/8/05	21.0	
RB-12V	7/12/05	64.0, 84.0, 92.0	
RB-12Va	7/15, 18/05	29.0, 42.0, 53.5	
RB-13Va	7/27/05	24.5, 51.5, 71.5	

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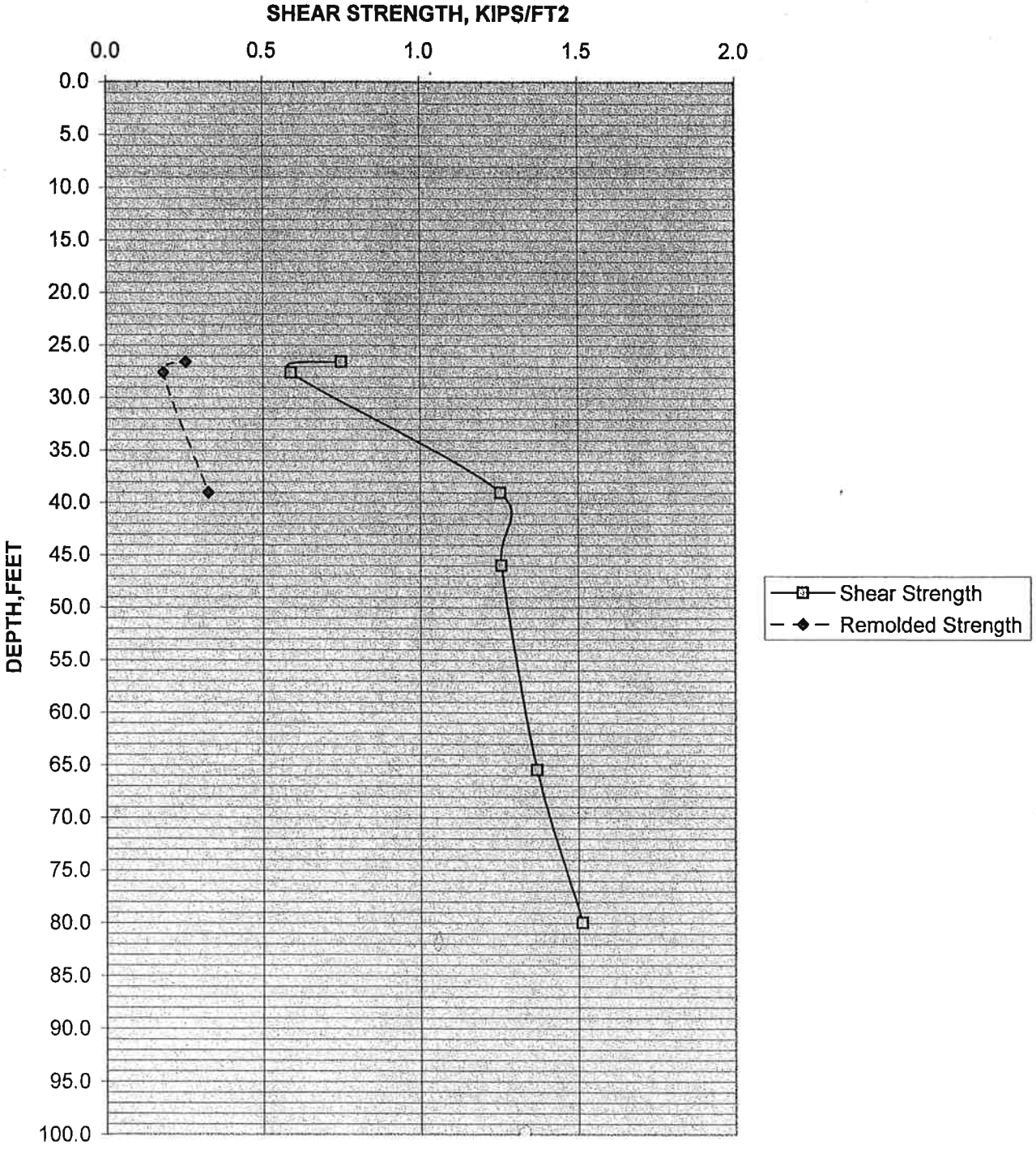
FIELD VANE SHEAR TEST RESULTS
NEWBY ISLAND
LOCATION: RB-10V & RB-10Va



CLIENT JOB NO.:
GREGG JOB NO:
LOCATION: RB-10V & RB-10Va
DATE: 7/6/2005 & 7/7/2005
VANE TYPE: Envi, MemoVane
VANE DIAMETER, d (mm): 55 D= 0.055
VANE Length, l (mm): 110 $1N/M^2$=1Pascal

UNDRAINED SHEAR STRENGTH, $c_u = 6M/7\pi D^3$ Where: M=Max. Recorded Torque, D= Vane Diiameter

DEPTH (M)	DEPTH (FT)	PEAK TORQUE READING (Nm)	SHEAR STRENGTH (N/m^2)	SHEAR STRENGTH (KIPS/FT^2)	REMOLDED PEAK IAL READIN (FT-LBS)	REMOLDED SHEAR STRENGTH (kN/m^2)	REMOLDED SHEAR STRENGTH (KIPS/FT^2)	SENSITIVITY
8.10	26.6	21.86	35848.07	0.749	7.44	12200.81	0.255	2.9
8.41	27.6	17.21	28222.57	0.589	5.3	8691.44	0.182	3.2
11.90	39.0	36.67	60134.89	1.256	9.52	15611.79	0.326	3.9
14.02	46.0	36.74	60249.69	1.258				
19.96	65.5	40	65595.74	1.370				
24.38	80.0	44.18	72450.49	1.513				

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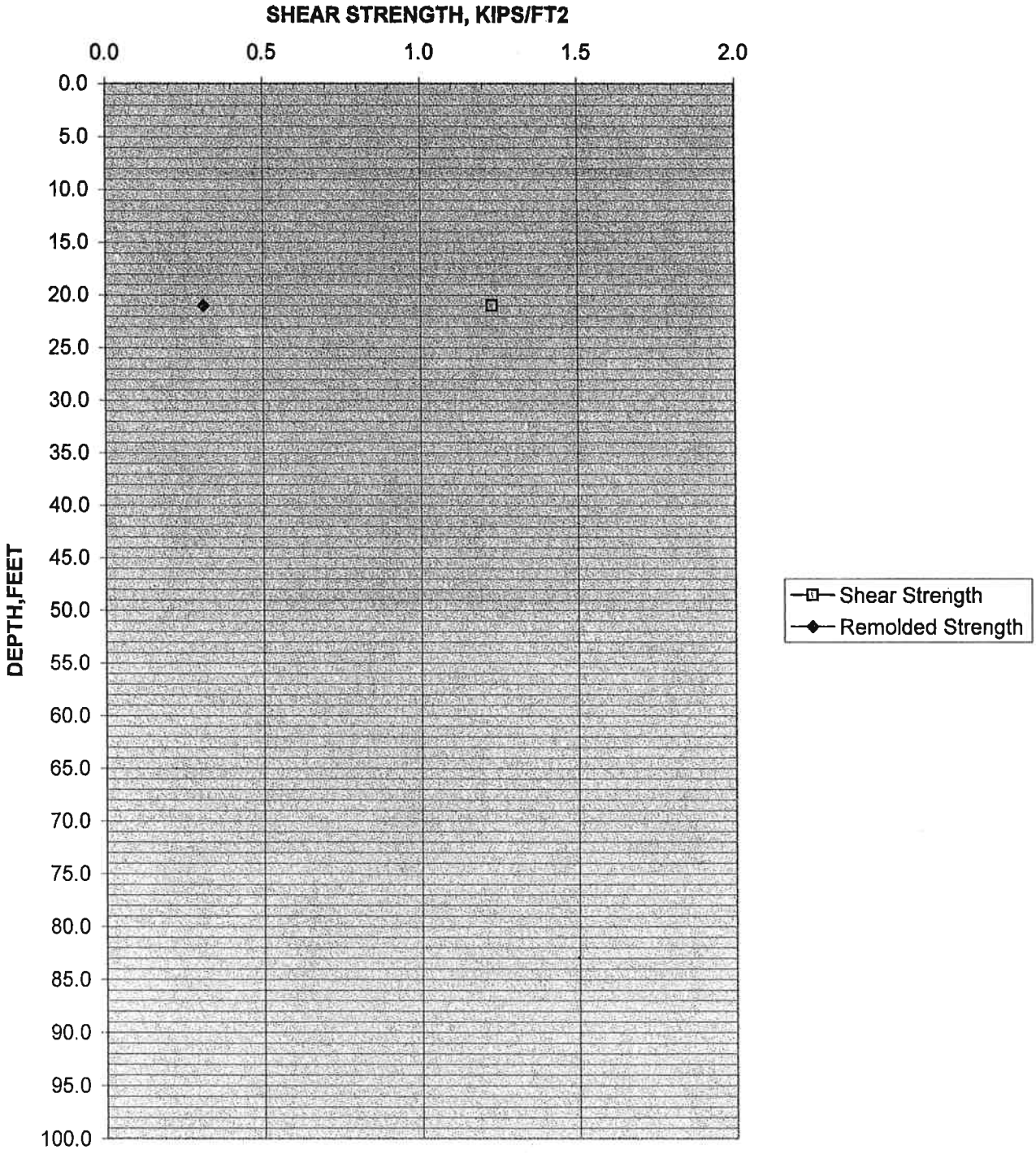
FIELD VANE SHEAR TEST RESULTS
NEWBY ISLAND
LOCATION: RB-11V



CLIENT JOB NO.:

GREGG JOB NO:

LOCATION: RB-11V

DATE: 8-Jul-05

VANE TYPE: Envi, MemoVane

VANE DIAMETER, d (mm): 55 D= 0.055

VANE Length, l (mm): 110 $1N/M^2$=1Pascal

UNDRAINED SHEAR STRENGTH, $c_u = 6M/7\pi D^3$ Where: M=Max. Recorded Torque, D= Vane Diiameter

DEPTH (M)	DEPTH (FT)	PEAK TORQUE READING (Nm)	SHEAR STRENGTH (N/m^2)	SHEAR STRENGTH (KIPS/FT^2)	REMOLDED PEAK IAL READIN((FT-LBS)	REMOLDED SHEAR STRENGTH (kN/m^2)	REMOLDED SHEAR STRENGTH (KIPS/FT^2)	SENSITIVITY
6.40	21.0	35.9	58872.18	1.230	9.1	14923.03	0.312	3.9

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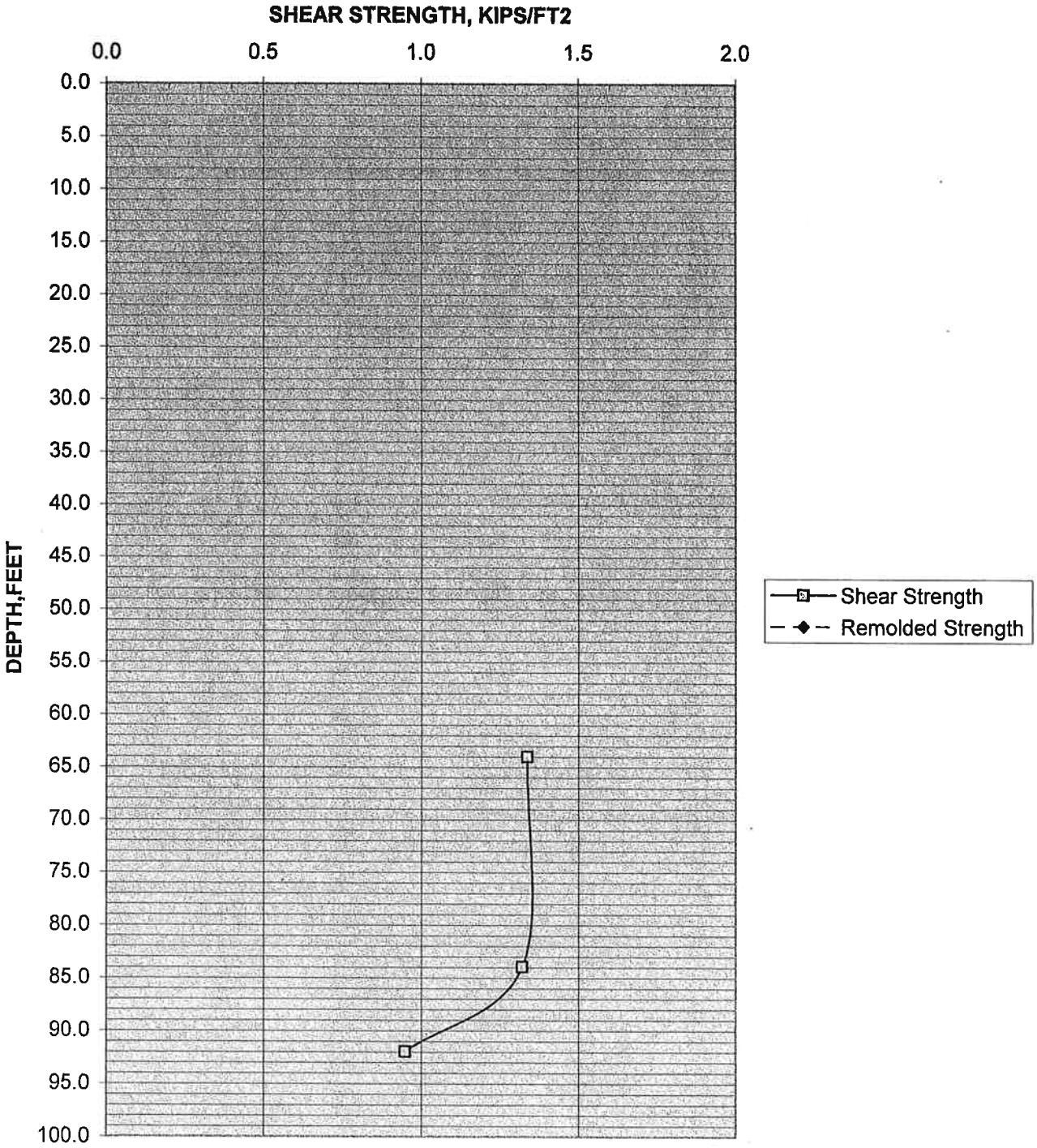
FIELD VANE SHEAR TEST RESULTS
NEWBY ISLAND
LOCATION: RB-12V



CLIENT JOB NO.:
GREGG JOB NO:
LOCATION: RB-12V
DATE: 12-Jul-05
VANE TYPE: Envi, MemoVane
VANE DIAMETER, d (mm): 55 D= 0.055
VANE Length, l (mm): 110 $1N/M^2$=1Pascal

UNDRAINED SHEAR STRENGTH, $c_u = 6M/7\pi D^3$ Where: M=Max. Recorded Torque, D= Vane Diiameter

DEPTH (M)	DEPTH (FT)	PEAK TORQUE READING (Nm)	SHEAR STRENGTH (N/m^2)	SHEAR STRENGTH (KIPS/FT^2)	REMOLDED PEAK IAL READIN((FT-LBS)	REMOLDED SHEAR STRENGTH (kN/m^2)	REMOLDED SHEAR STRENGTH (KIPS/FT^2)	SENSITIVITY
19.52	64.0	39.09	64103.44	1.339				
25.60	84.0	38.6	63299.89	1.322				
28.04	92.0	27.73	45474.25	0.950				

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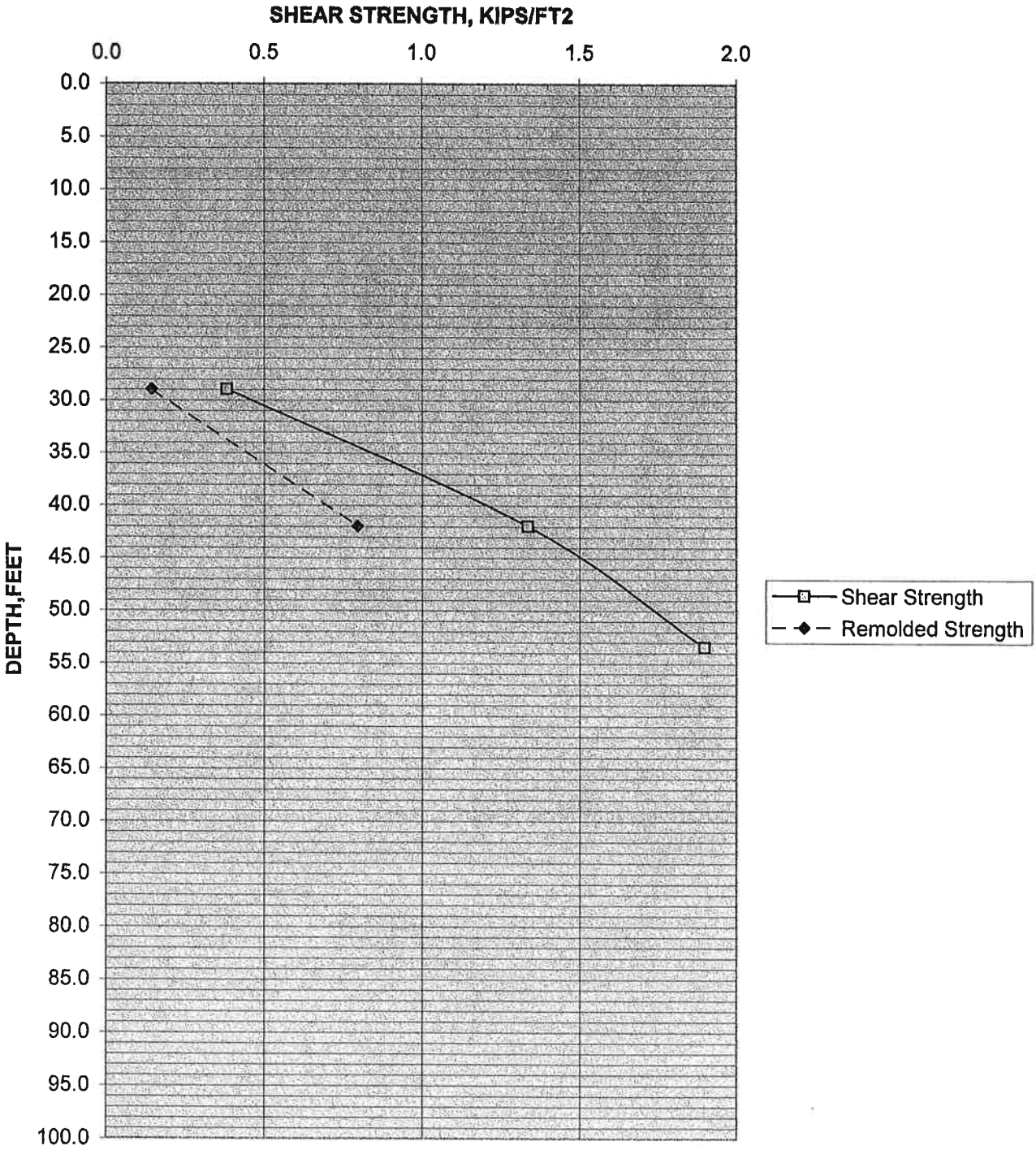
FIELD VANE SHEAR TEST RESULTS
NEWBY ISLAND
LOCATION: RB-12Va

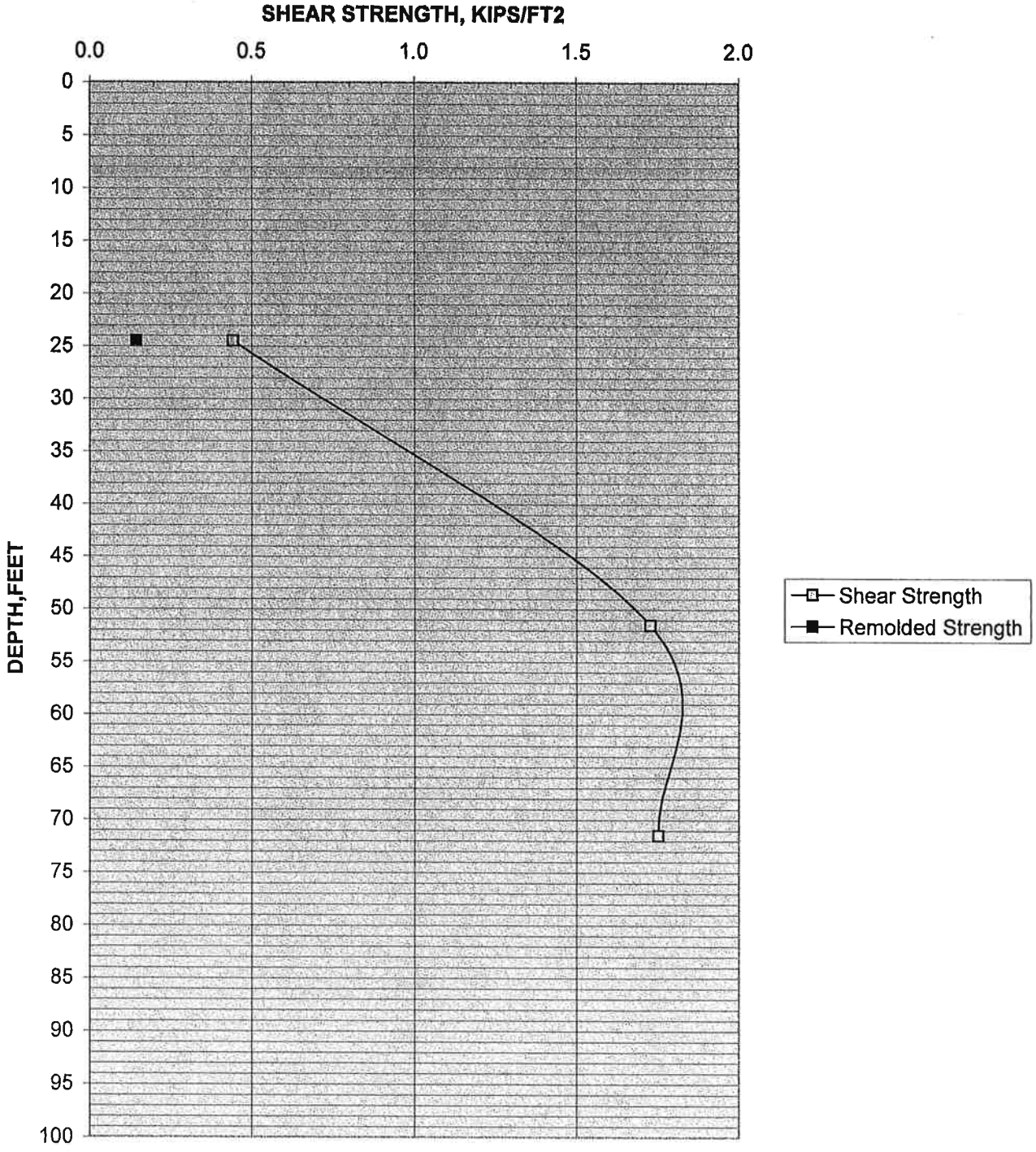


CLIENT JOB NO.:
GREGG JOB NO:
LOCATION: RB-12Va
DATE: 15 &18 Jul 2005
VANE TYPE: Envi, MemoVane
VANE DIAMETER, d (mm): 55 D= 0.055
VANE Length, l (mm): 110 $1N/M^2$=1Pascal

UNDRAINED SHEAR STRENGTH, $c_u = 6M/7\pi D^3$ Where: M=Max. Recorded Torque, D= Vane Diiameter

DEPTH (M)	DEPTH (FT)	PEAK TORQUE READING (Nm)	SHEAR STRENGTH (N/m^2)	SHEAR STRENGTH (KIPS/FT^2)	REMOLDED PEAK IAL READIN((FT-LBS)	REMOLDED SHEAR STRENGTH (kN/m^2)	REMOLDED SHEAR STRENGTH (KIPS/FT^2)	SENSITIVITY
8.83	29.0	11.16	18301.21	0.382	4.19	6871.15	0.144	2.7
12.80	42.0	39.03	64005.04	1.337	23.26	38143.92	0.797	1.7
16.30	53.5	55.45	90932.09	1.899				

FIELD VANE SHEAR TEST RESULTS
NEWBY ISLAND
LOCATION: RB-13Va



GREGG IN SITU

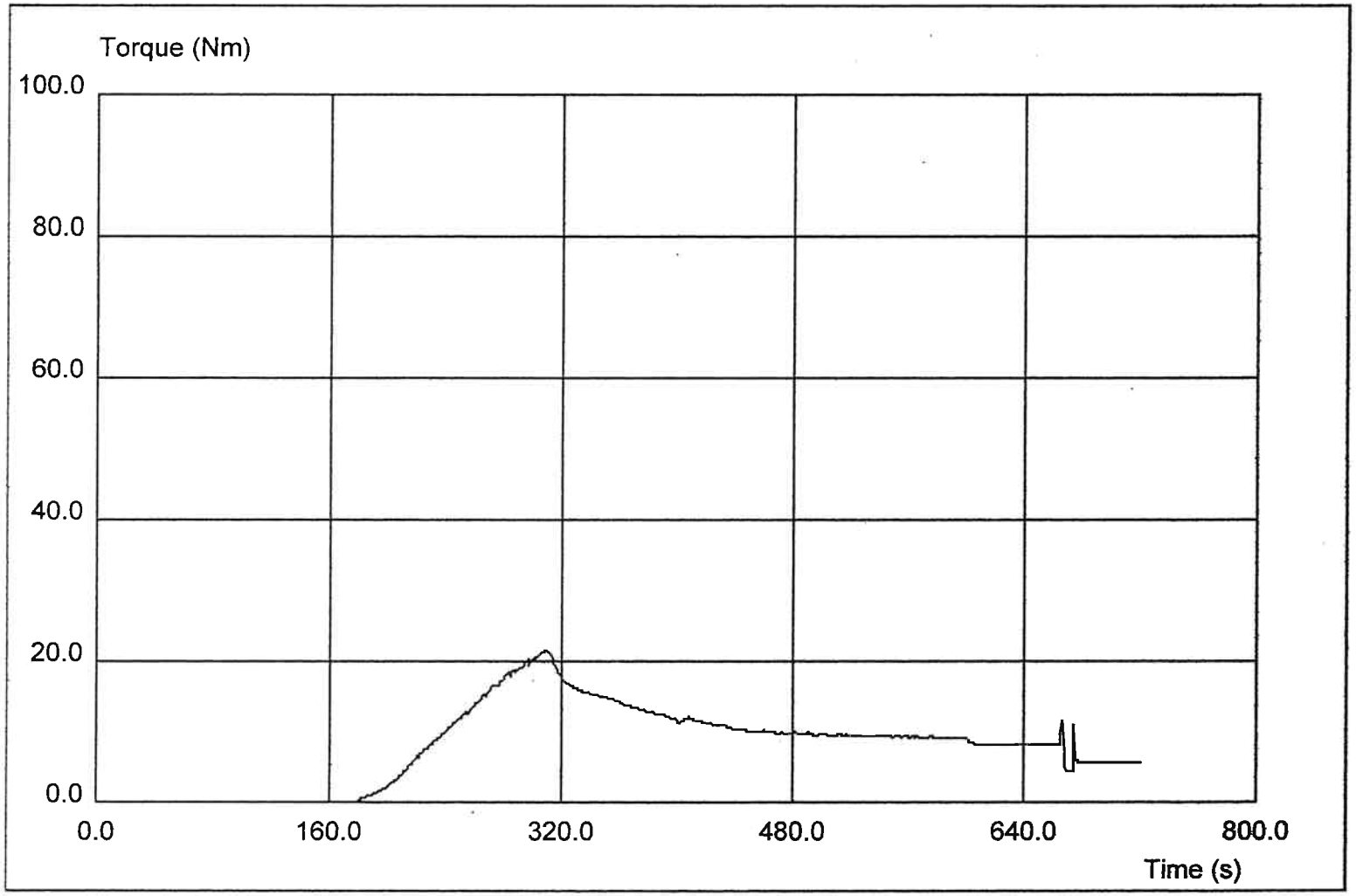
FIELD VANE SHEAR TEST RESULTS

JOB NAME: NUBY ISLAND LANDFILL
CLIENT JOB NO.:
GREGG JOB NO:
LOCATION: RB-13va
DATE:
VANE TYPE: Rocktest w/ 20 degree slip coupling
VANE HEIGHT: 4.094
VANE DIAMETER, d (In): 3
VANE CONSTANT: 0.041673961 For a Tapered Vane $K=(\pi/1728)*(D^2H/2)*[1+(D/3H)]$
TORQUE LENGTH, l (ft):: 1.5

DEPTH (M)	DEPTH (FT)	DIAL READING (LBS)	FRICTION DIAL READING (LBS)	SHEAR STRENGTH (KSF)	REMOLD DIAL READING (LBS)	REMOLD FRICTION DIAL READING (LBS)	REMOLD SHEAR STRENGTH (KSF)	SENSATIVITY
7.47	24.5	20.5	2.00	0.44	8.00	2.00	0.14	3.08
15.70	51.5	74	2.00	1.73				
21.79	71.5	75.5	2.50	1.75				

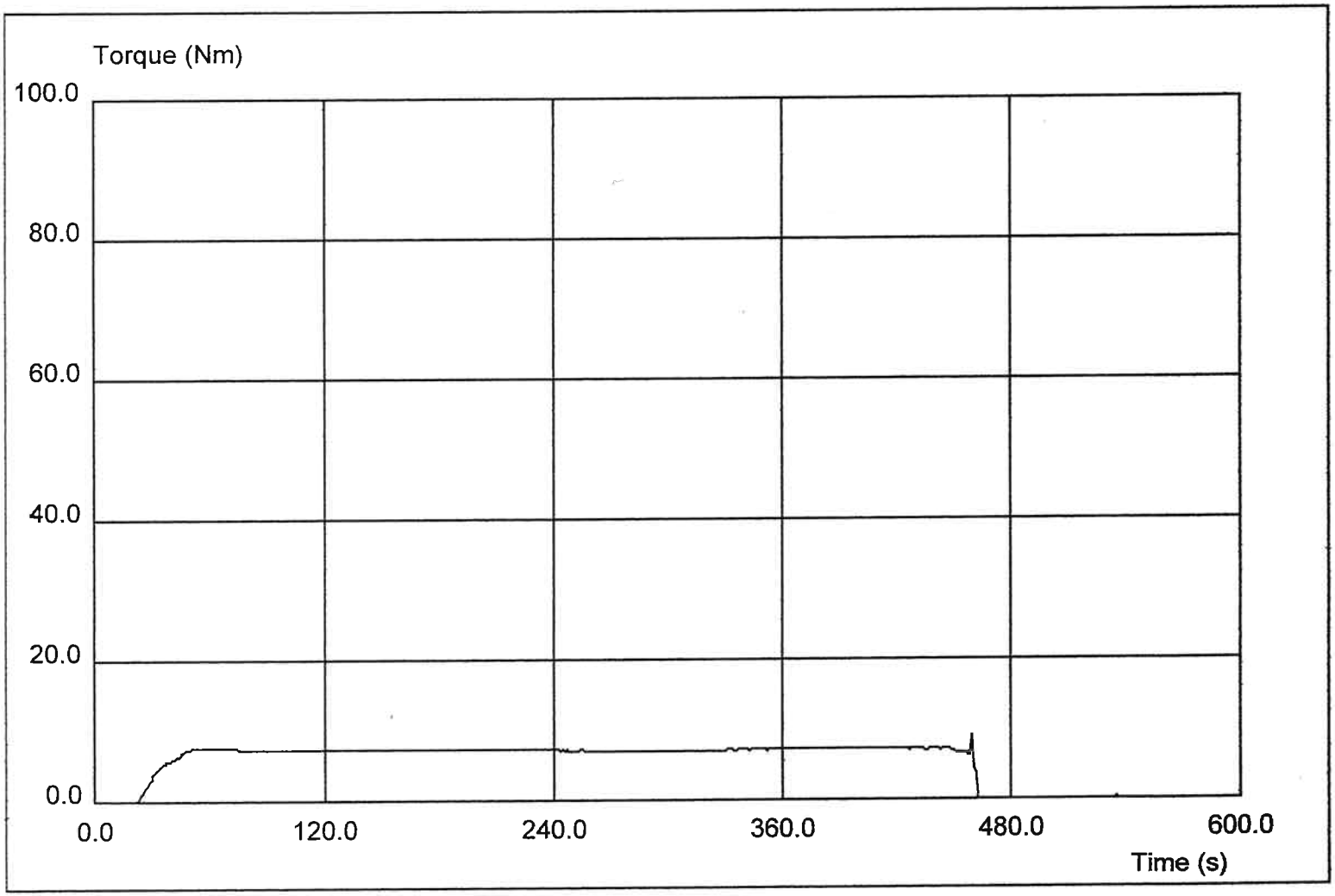
Test number: 6
Test level: 8.1
Vane size: 55

Project: NEWBY ISLAND
Id: RB-10V



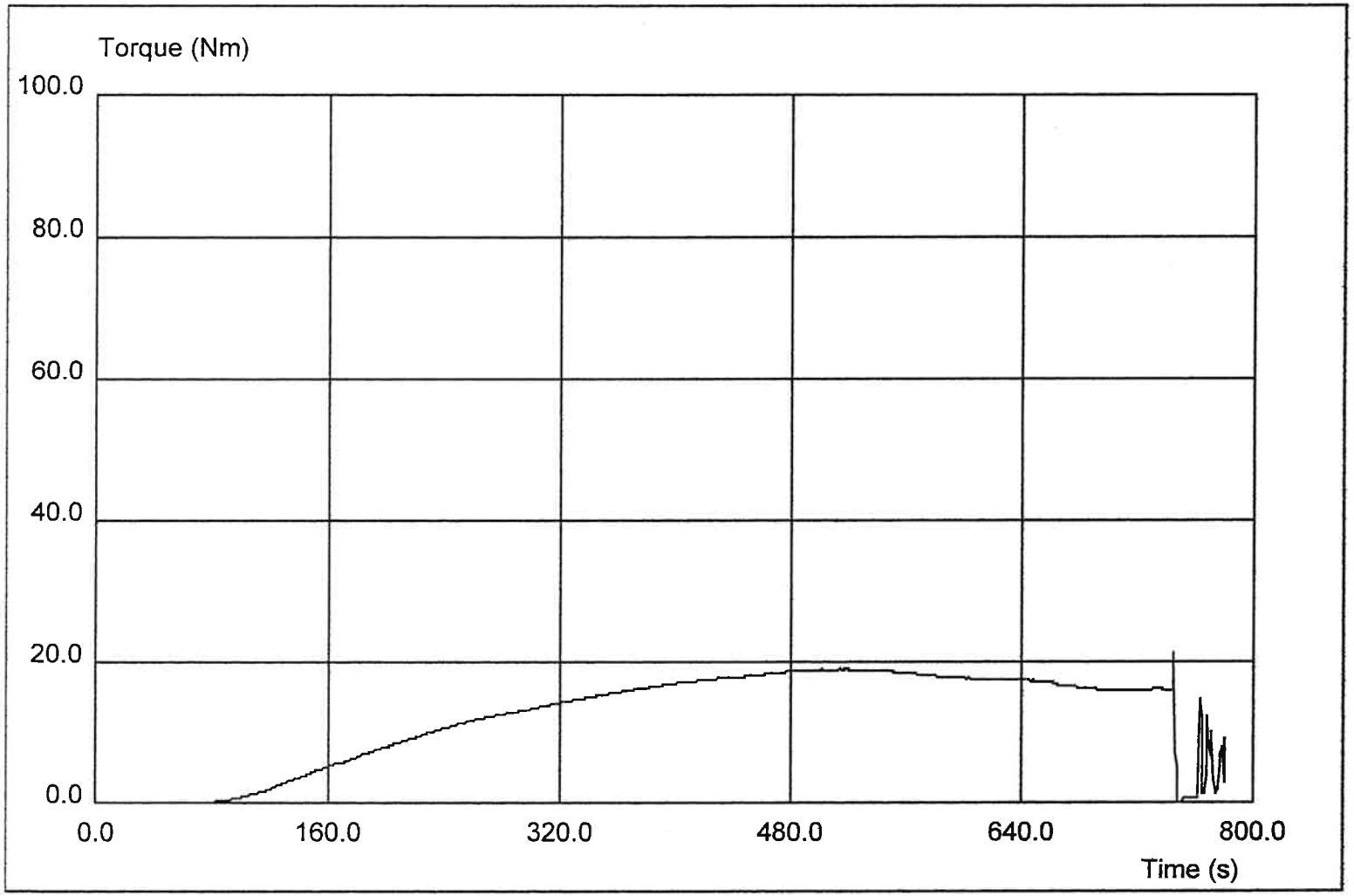
Test number: 7
Test level: 8.1
Vane size: 55

Project: NEWBY ISLAND
Id: RB-10V



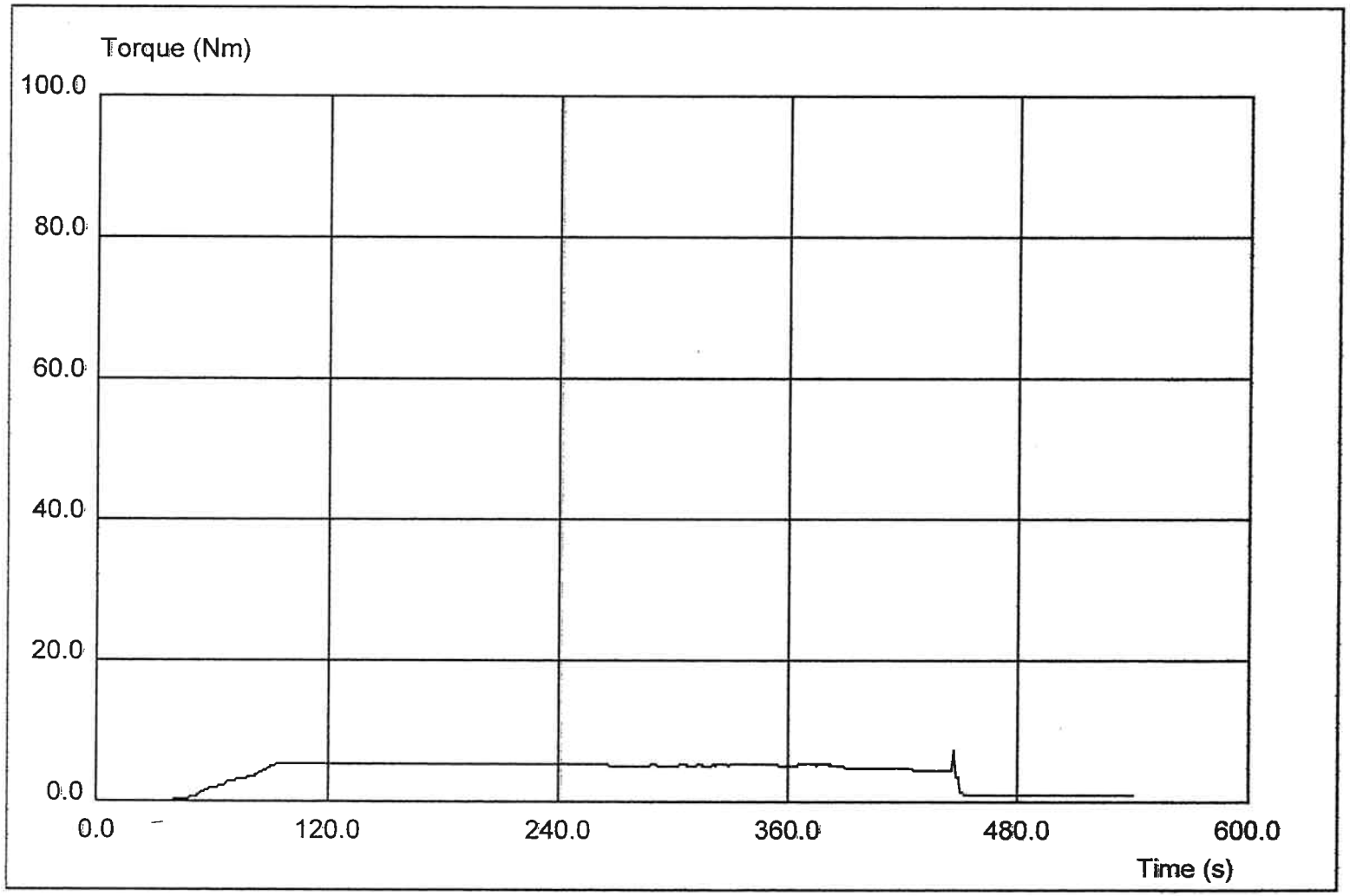
Test number: 8
Test level: 8.41
Vane size: 55

Project: NEWBY ISLAND
Id: RB-10V



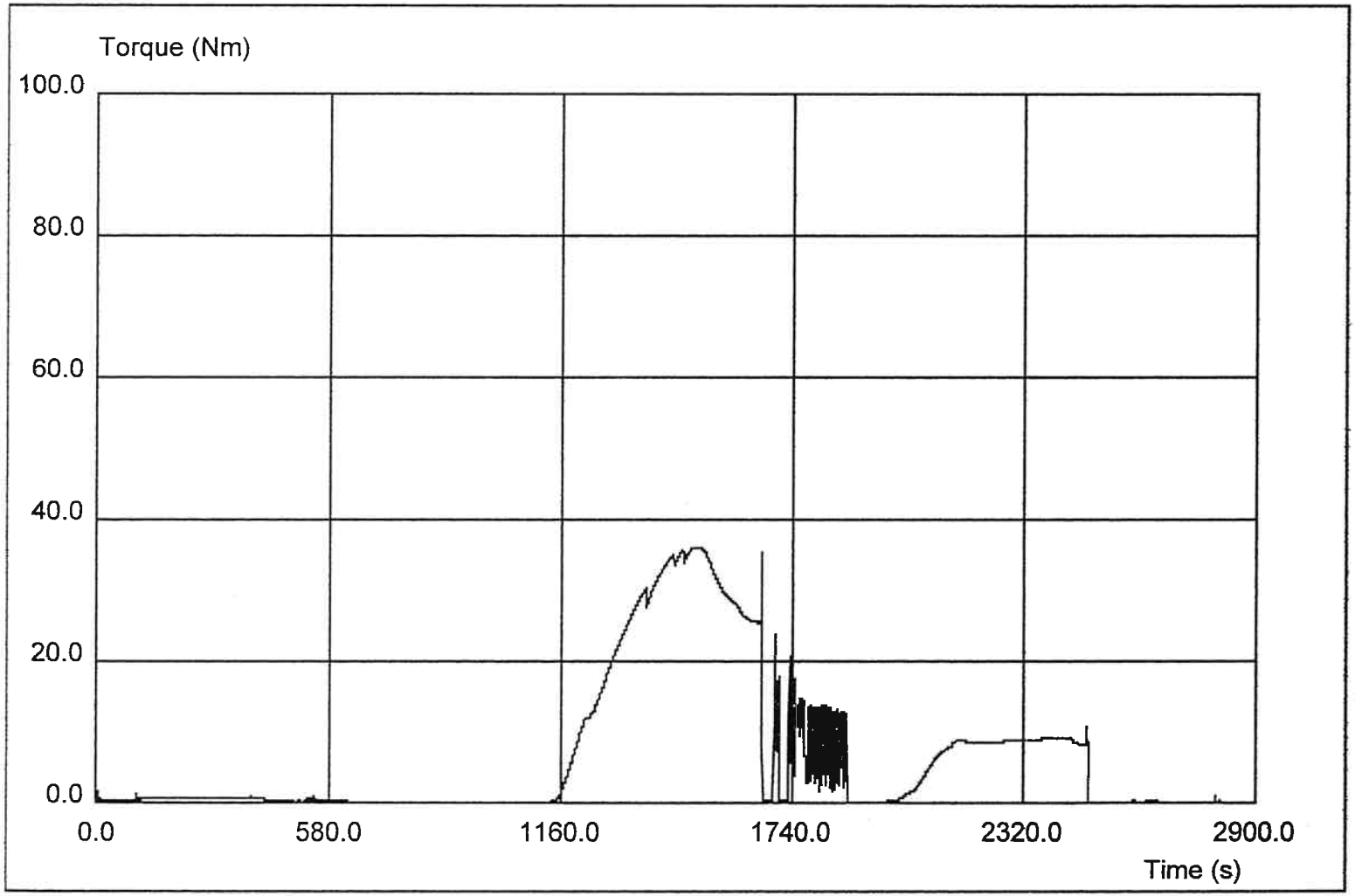
Test number: 9
Test level: 8.41
Vane size: 55

Project: NEWBY ISLAND
Id: RB-10V



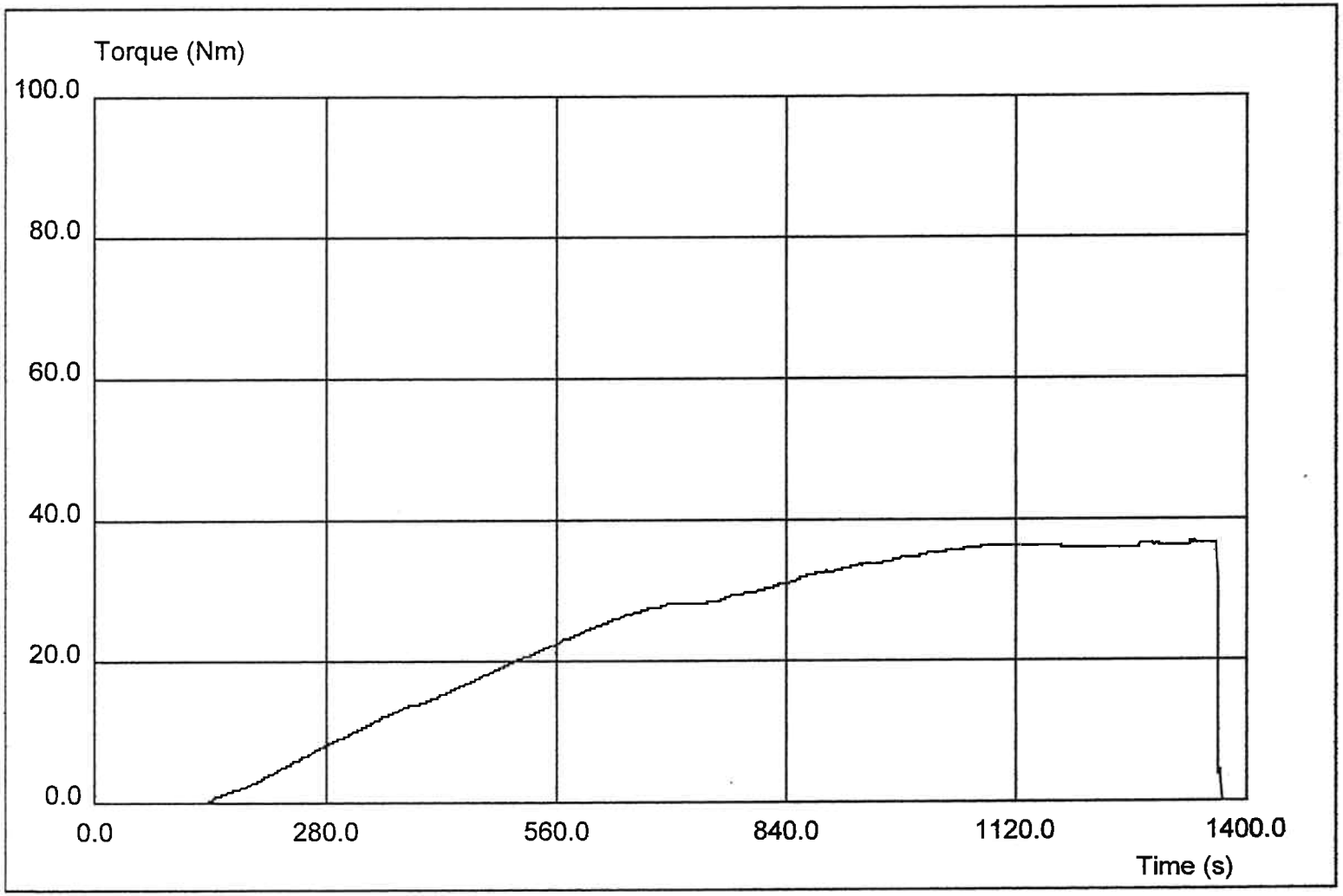
Test number: 17
Test level: 11.9
Vane size: 55

Project: NEWBY ISLAND
Id: RB-10Vb



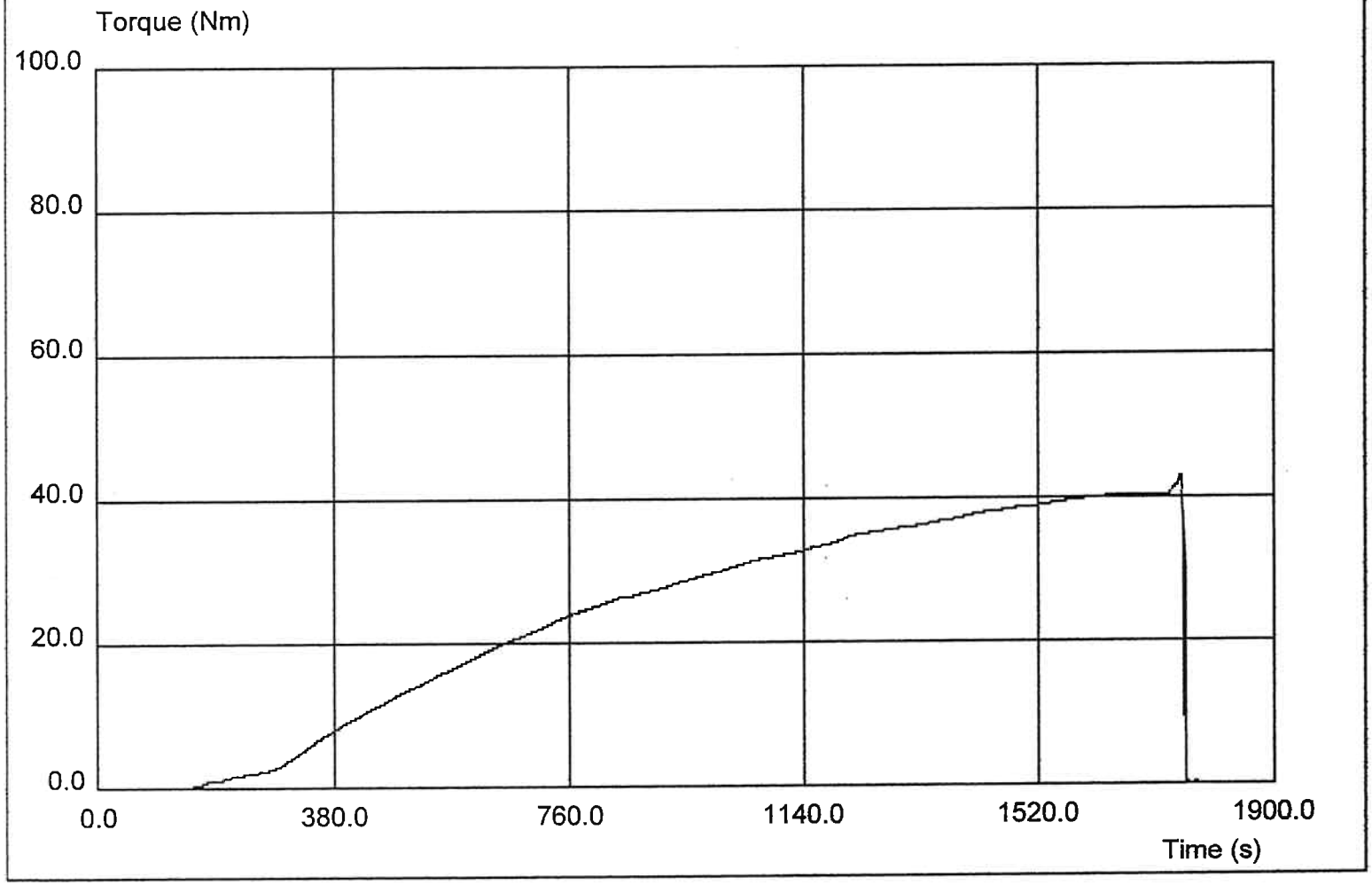
Test number: 9
Test level: 14.02
Vane size: 55

Project: NEWBY ISLAND
Id: RB-10VA-W4



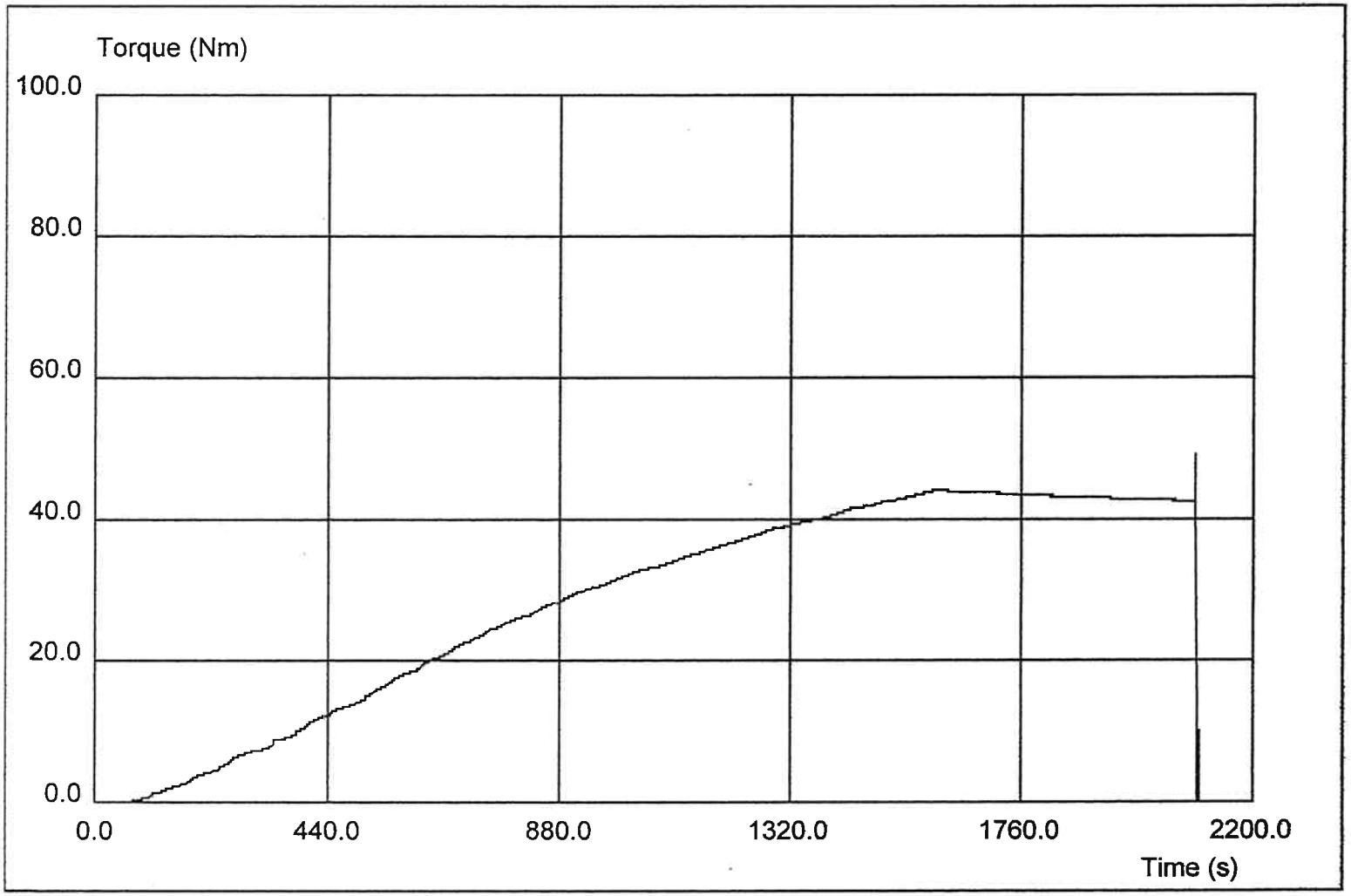
Test number: 46
Test level: 19.96
Vane size: 55

Project: NEWBY ISLAND
Id: RB-10VA-TH24



Test number: 44
Test level: 24.38
Vane size: 55

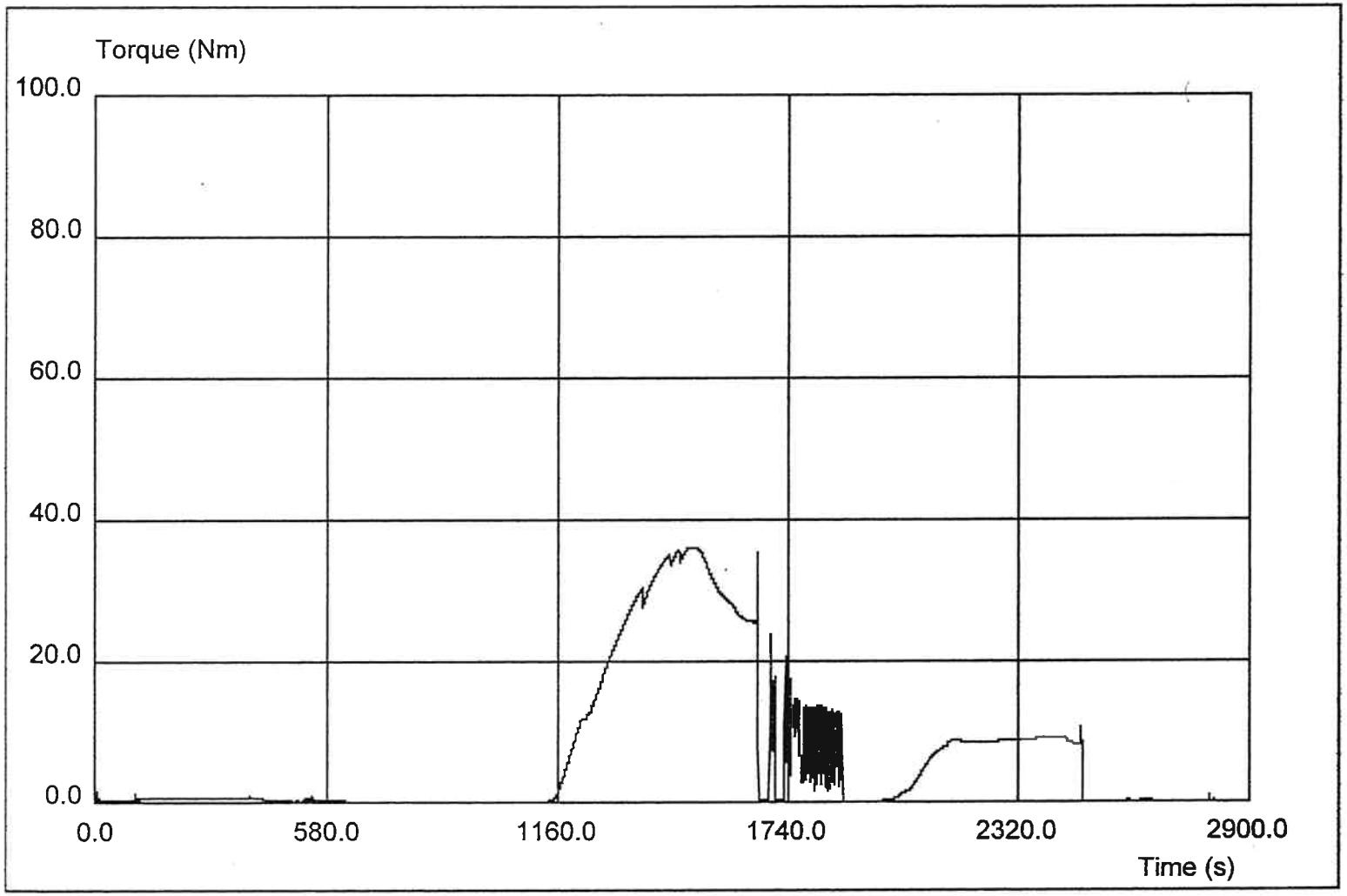
Project: NEWBY ISLAND
Id: RB-10Va-th



4.5 / 21.5 20

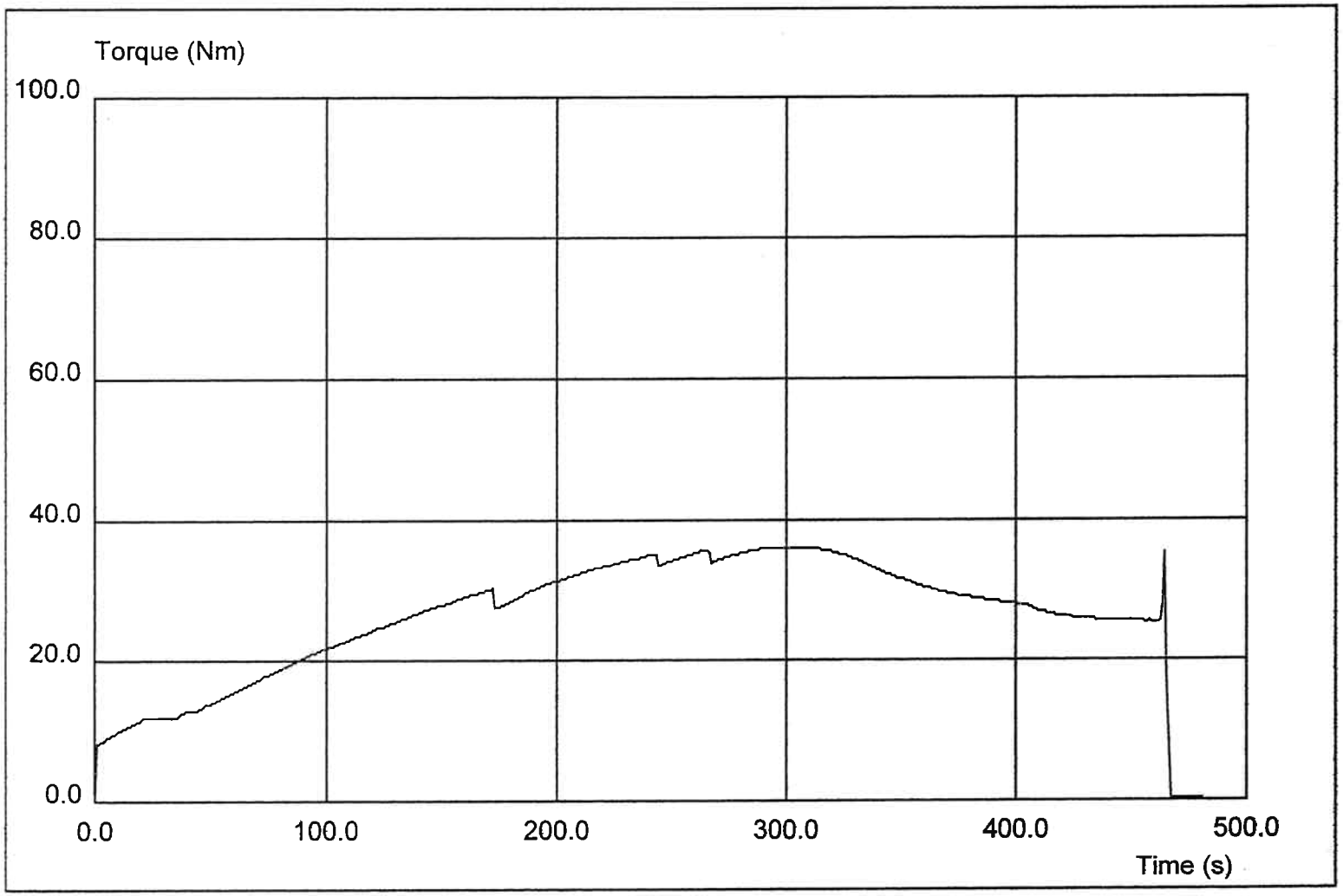
Test number: 19
Test level: 6.4
Vane size: 55

Project: NEWBY ISLAND
Id: RB-11V



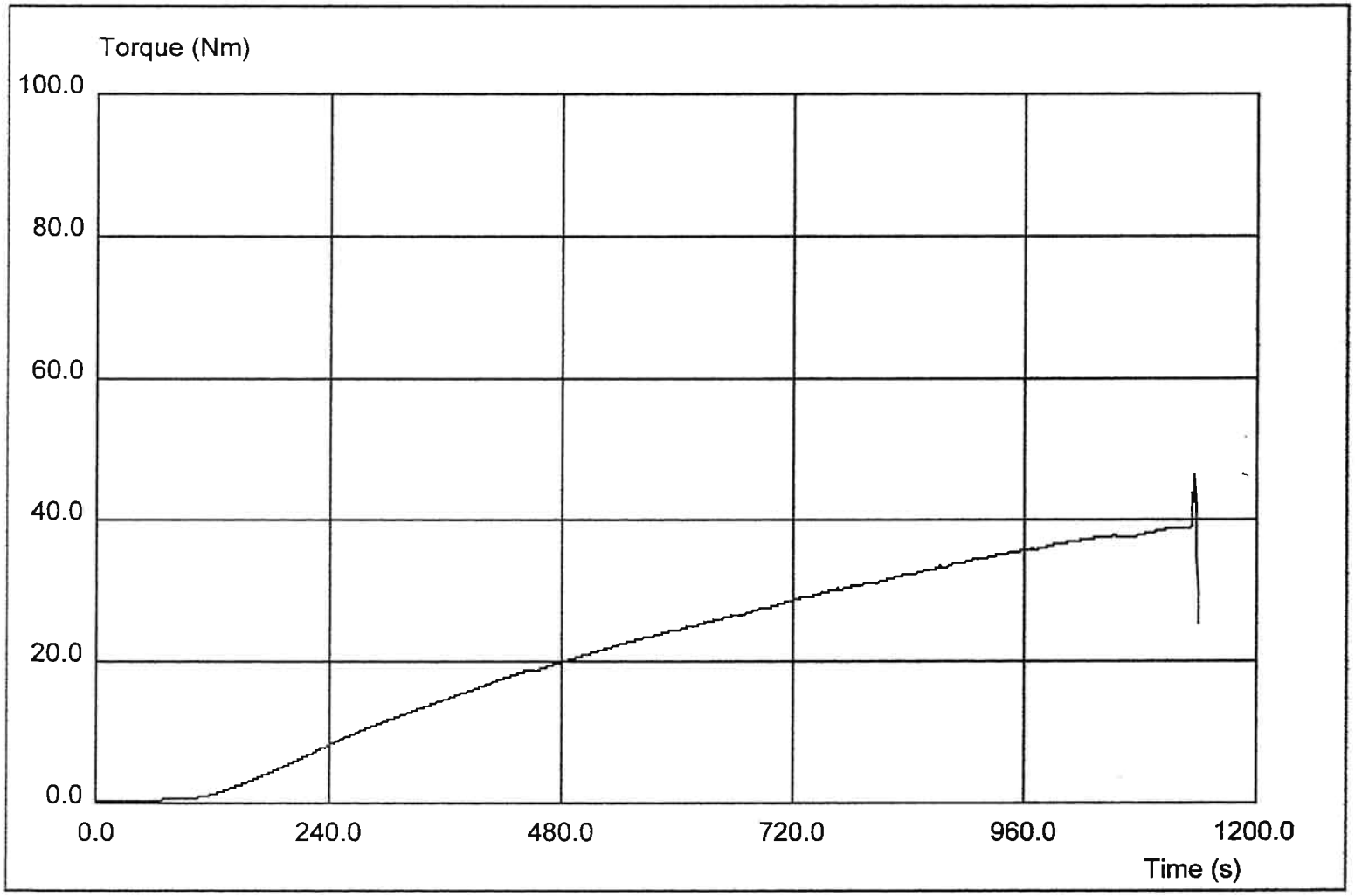
Test number: 31
Test level: 6.4
Vane size: 55

Project: NEWBY ISLAND
Id: RB-11V



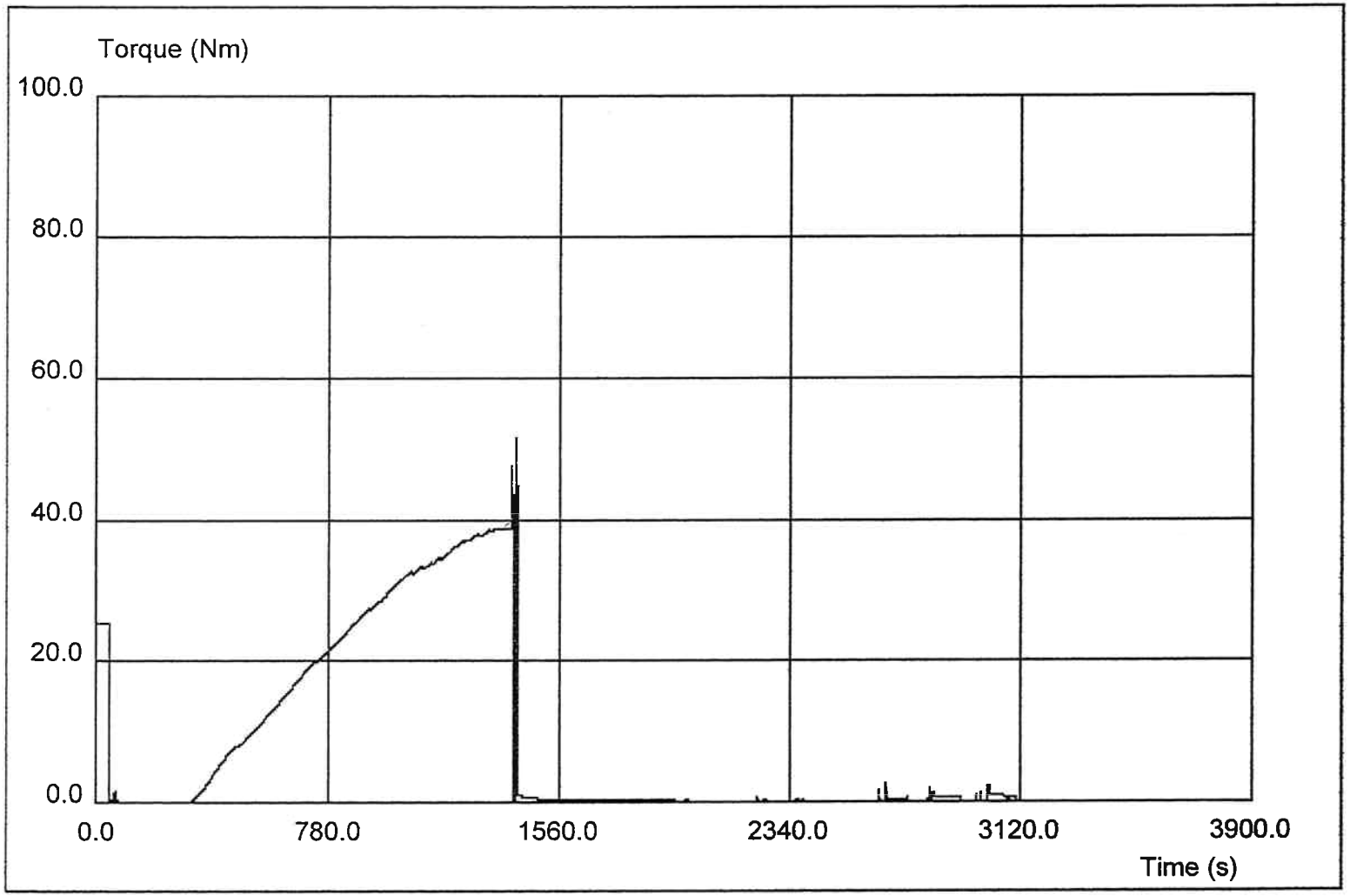
Test number: 9
Test level: 19.52
Vane size: 55

Project: NEWBY ISLAND
Id: RB-12V



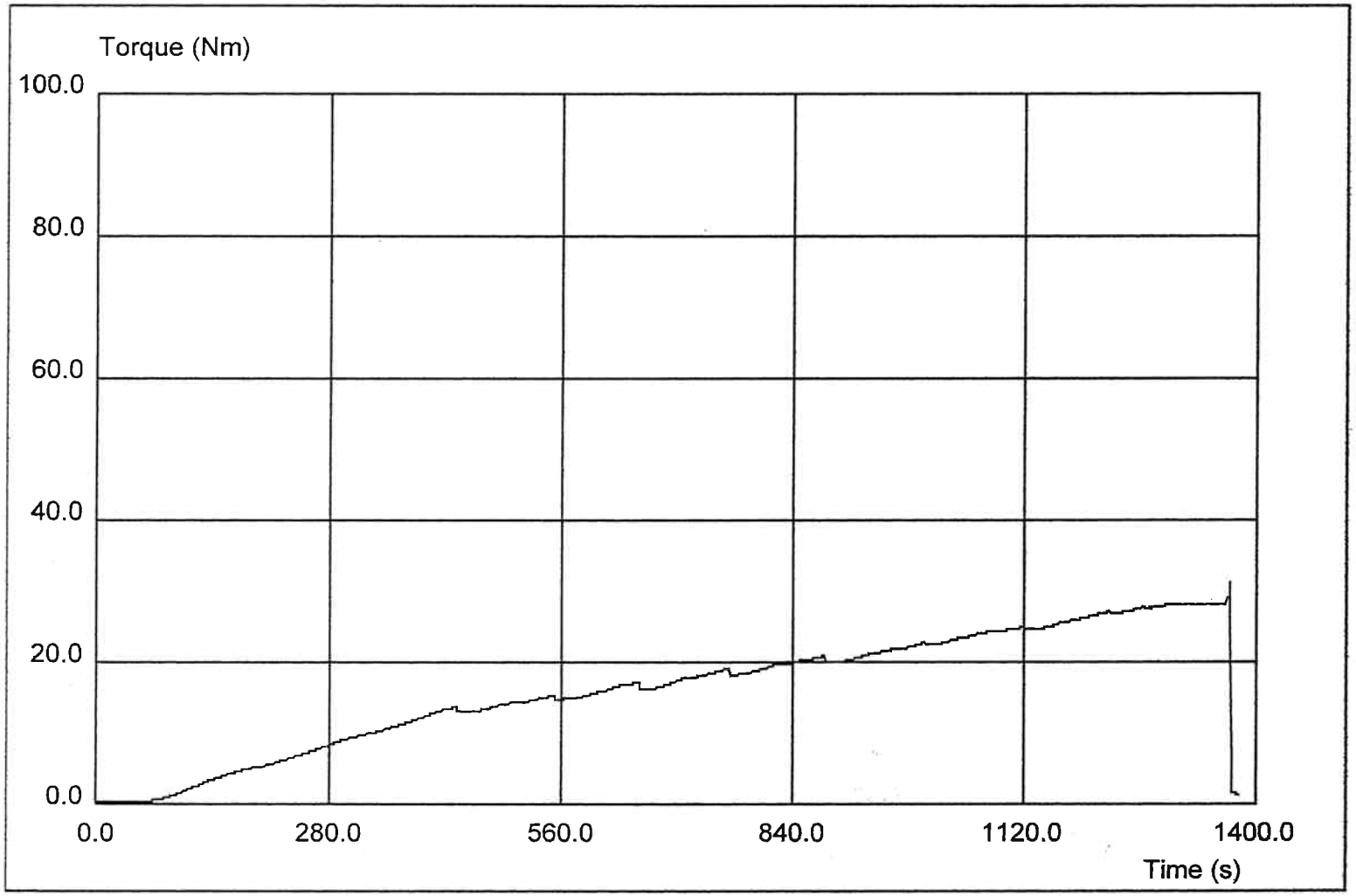
Test number: 10
Test level: 25.6
Vane size: 55

Project: NEWBY ISLAND
Id: RB-12V



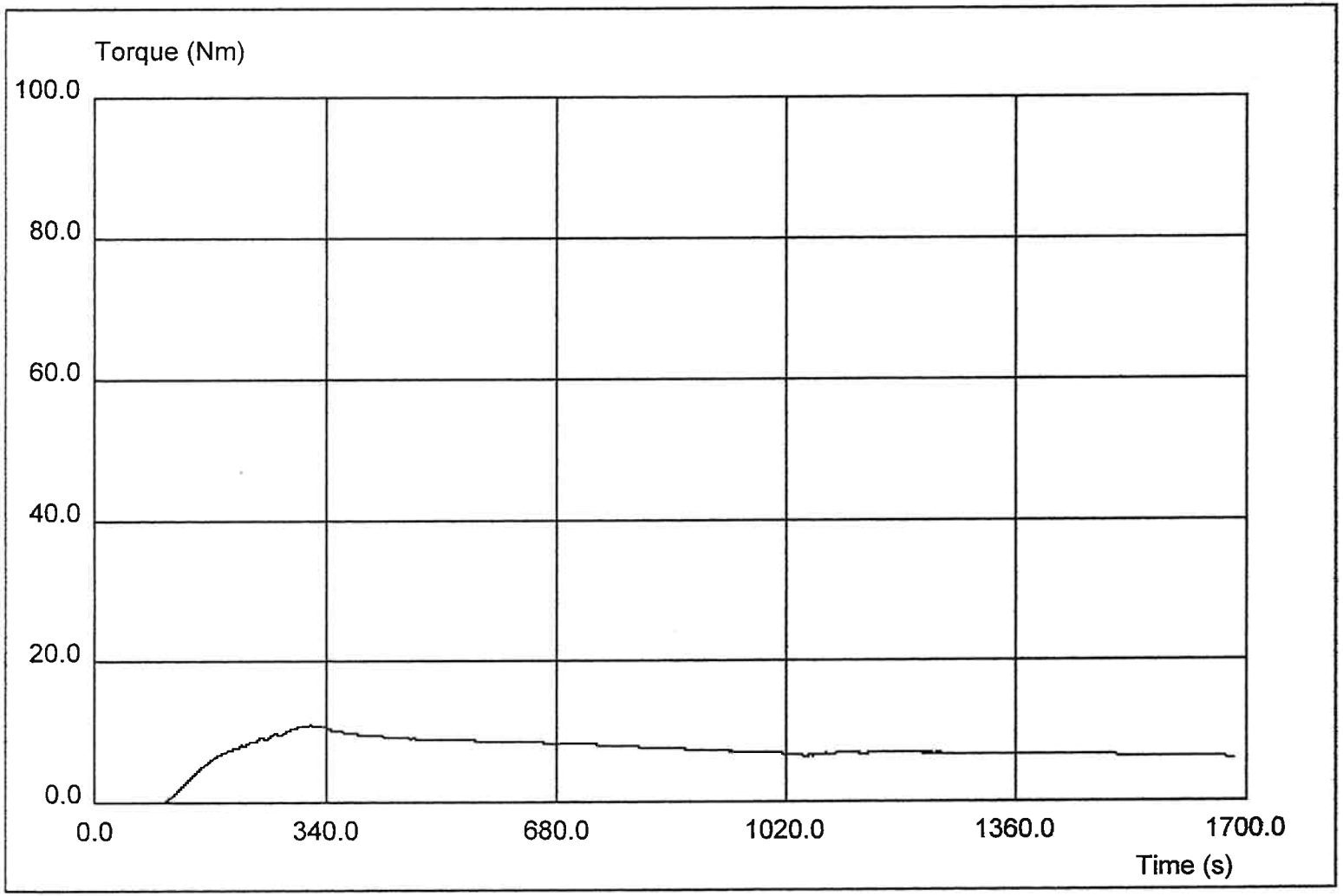
Test number: 11
Test level: 28.04
Vane size: 55

Project: NEWBY ISLAND
Id: RB-12V



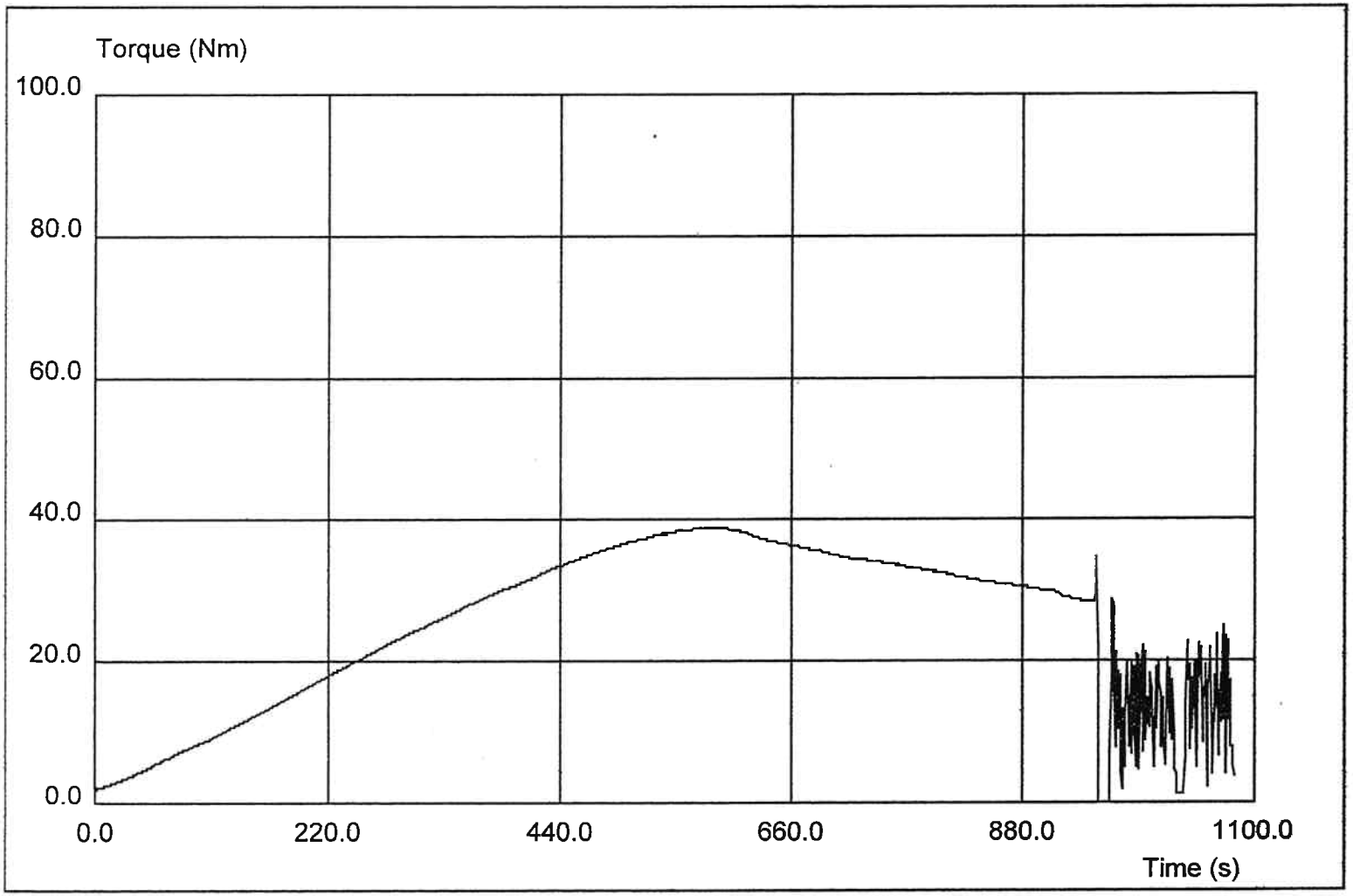
Test number: 50
Test level: 8.83
Vane size: 55

Project: NEWBY ISLAND
Id: RB-12Va



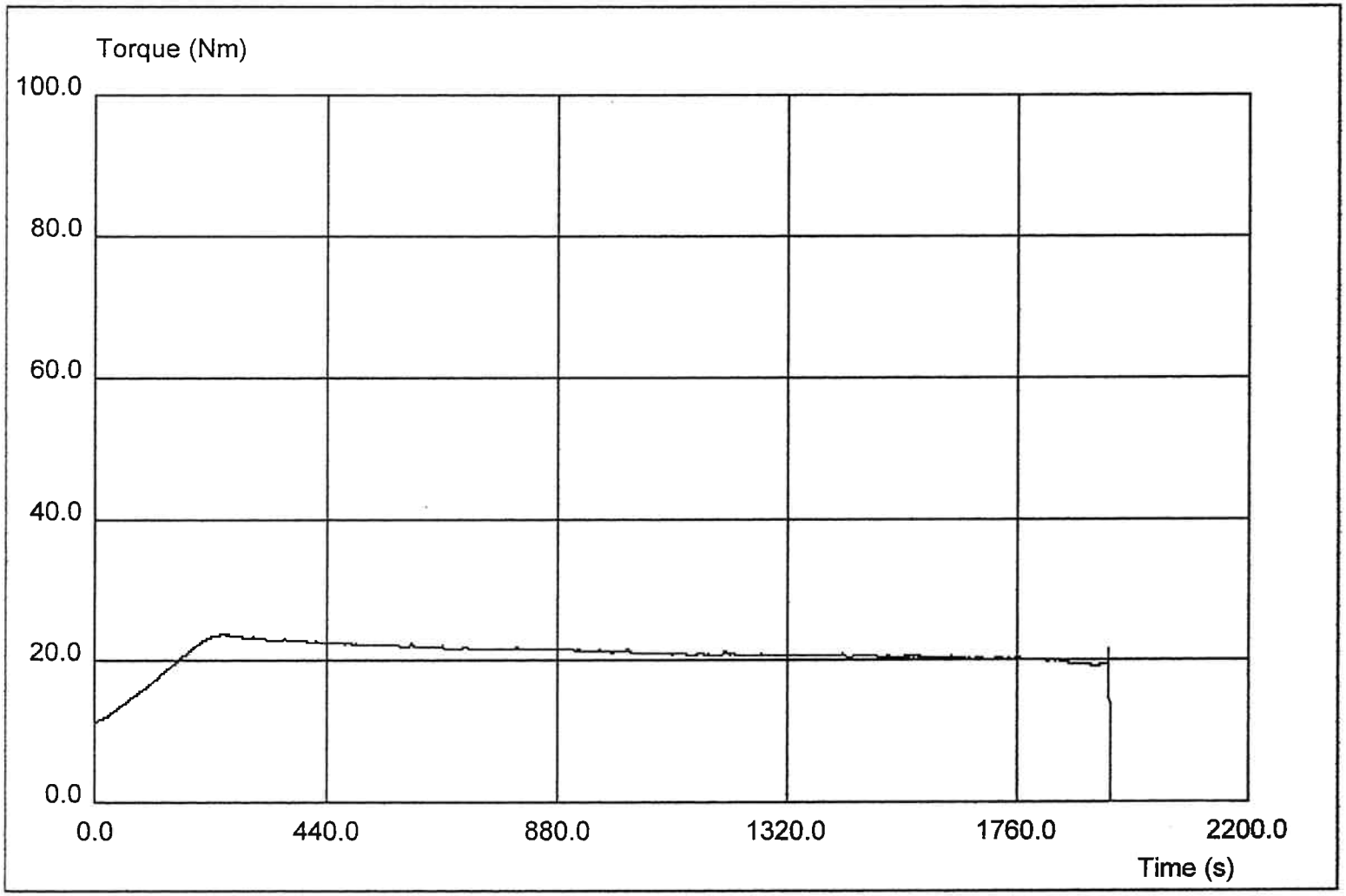
Test number: 63
Test level: 12.8
Vane size: 55

Project: NEWBY ISLAND
Id: RB-12Va



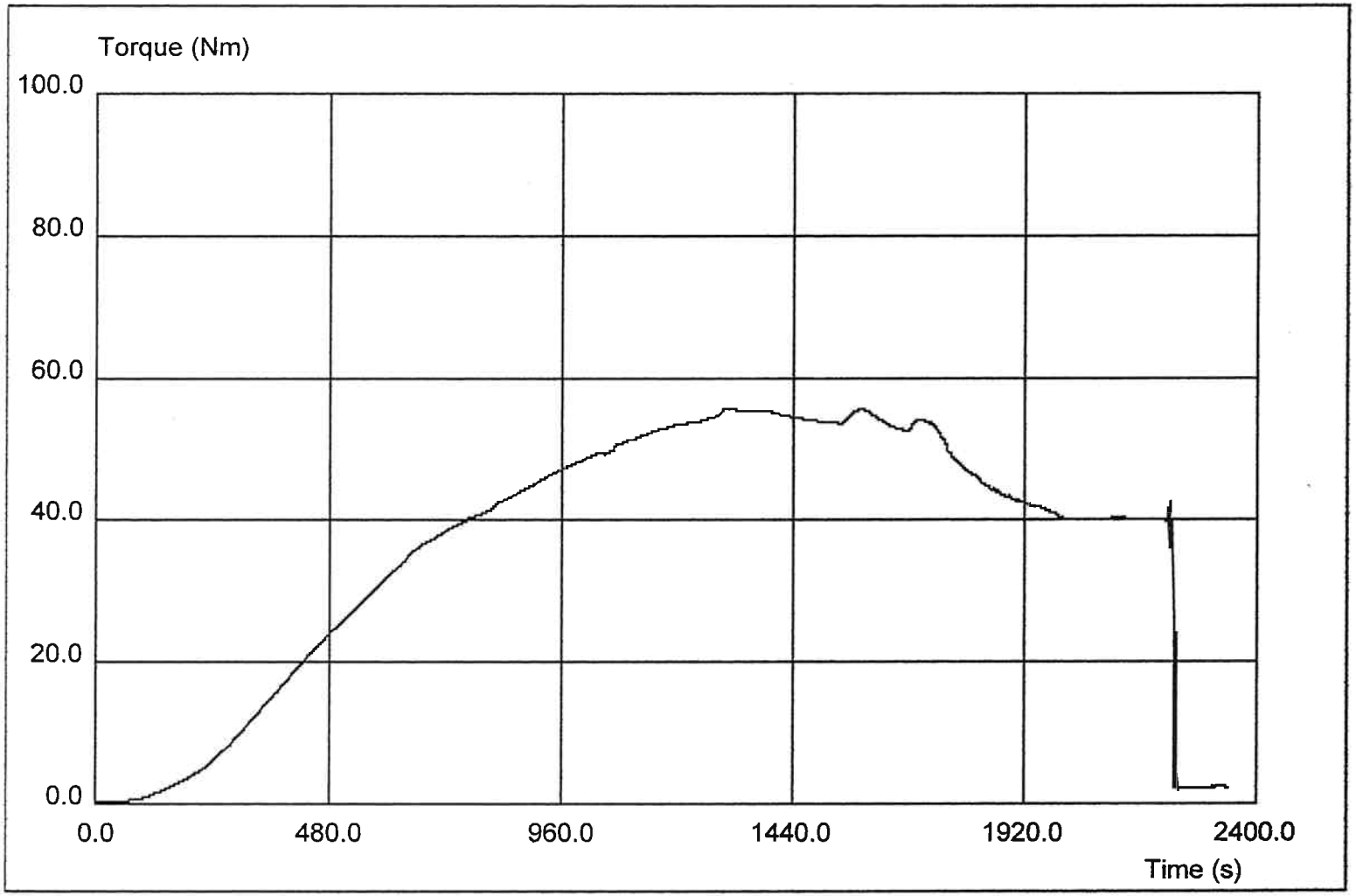
Test number: 64
Test level: 12.8
Vane size: 55

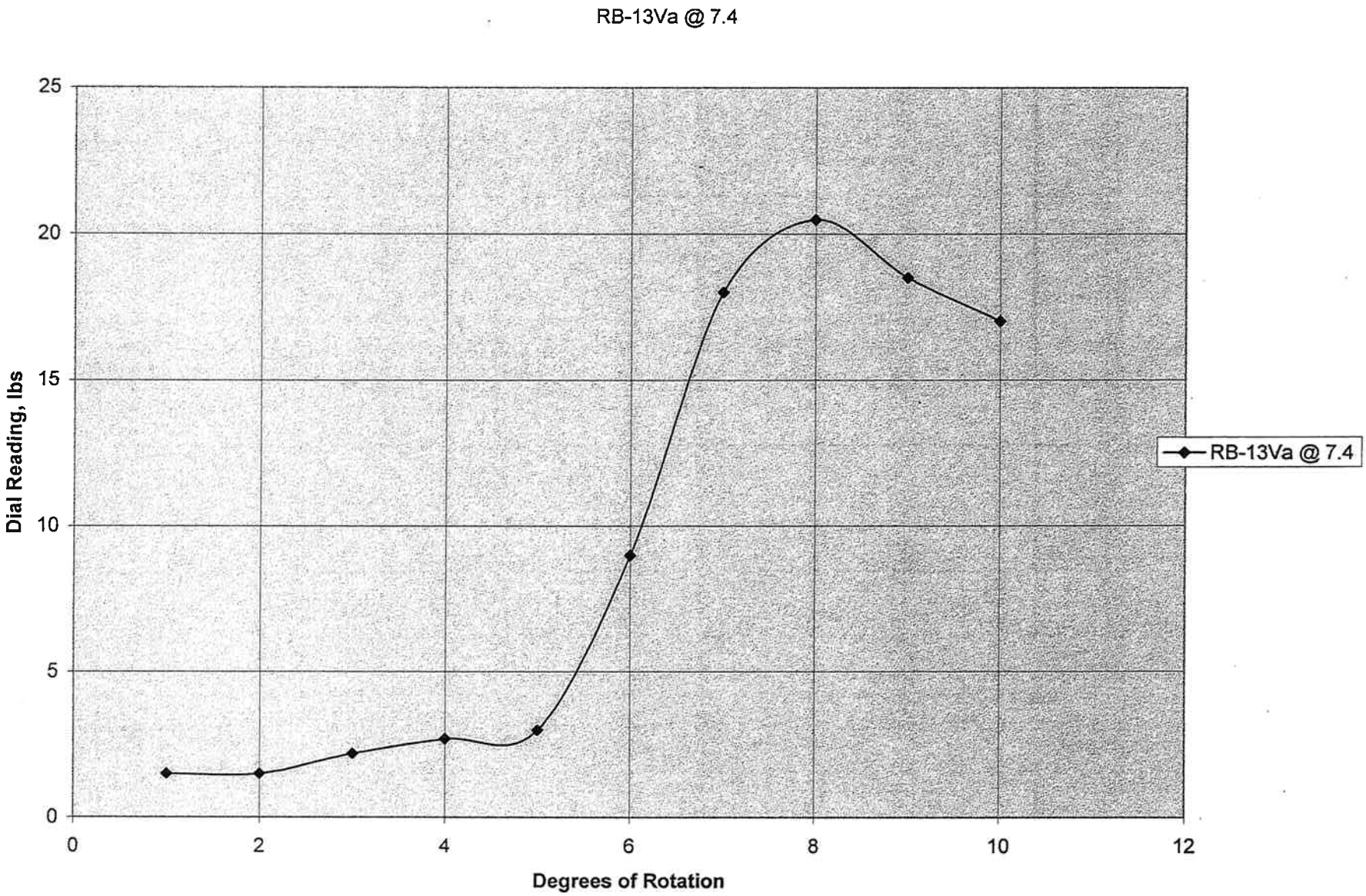
Project: NEWBY ISLAND
Id: RB-12Va

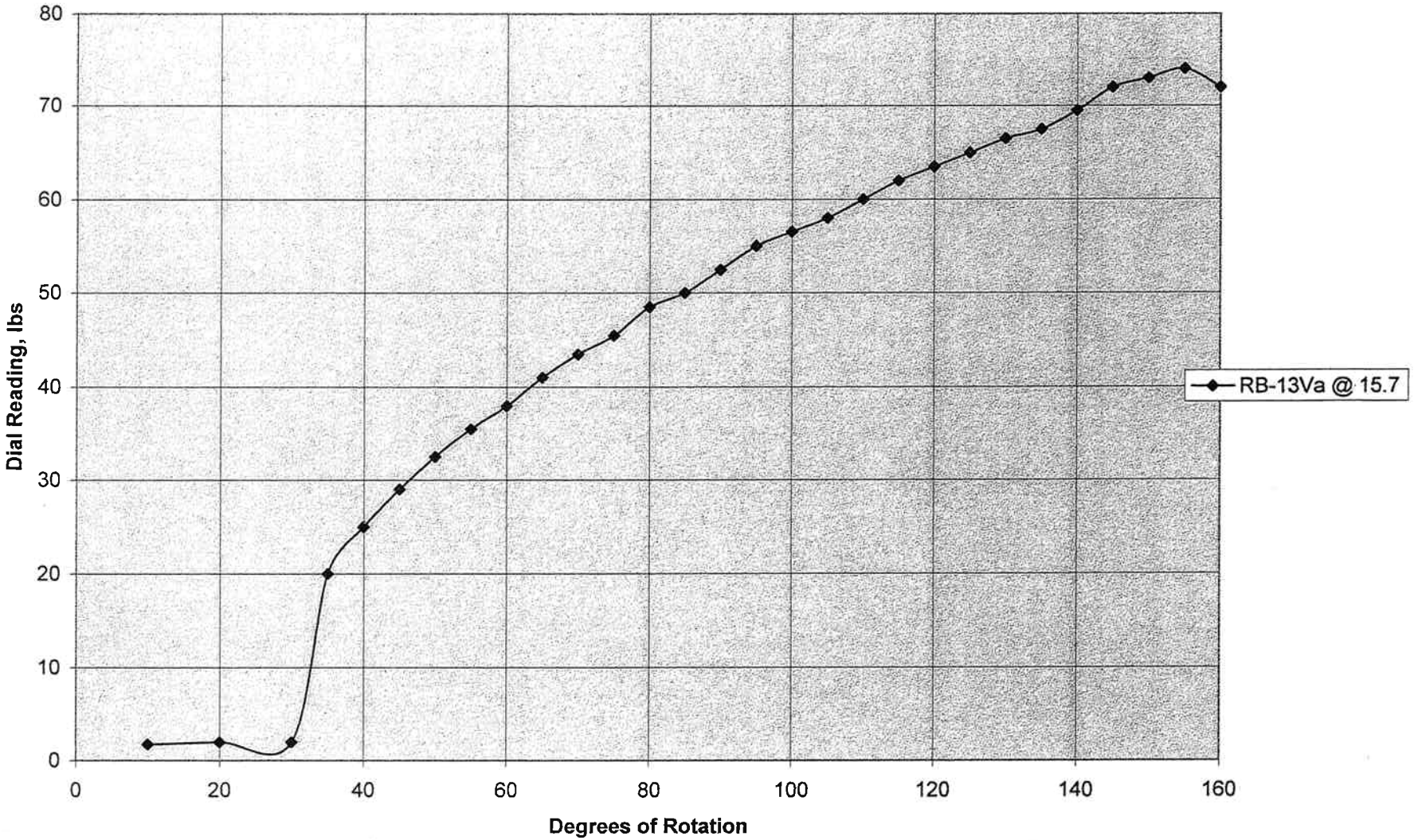


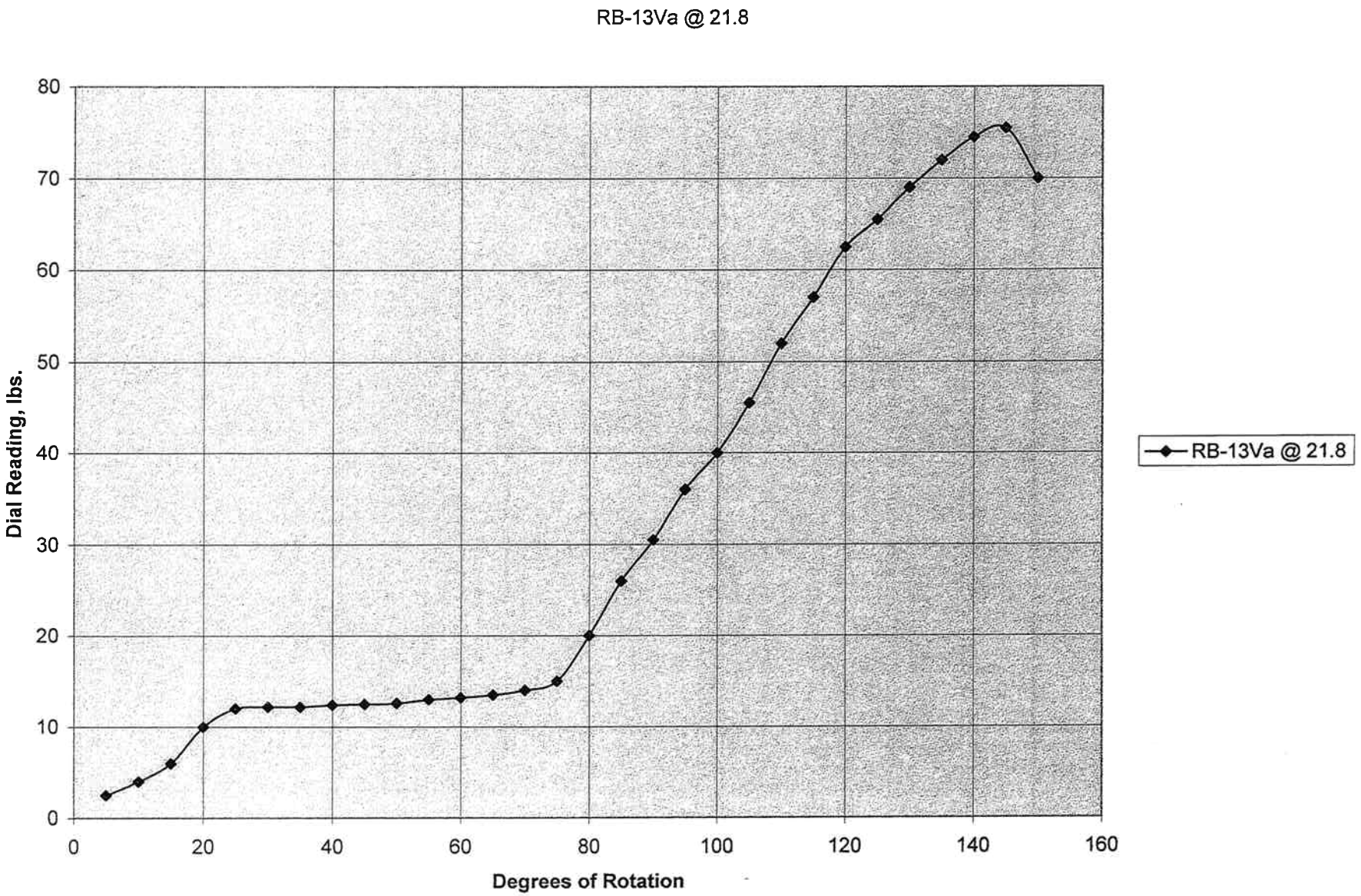
Test number: 77
Test level: 16.3
Vane size: 55

Project: NEWBY ISLAND
Id: RB-12Va




RB-13Va @ 7.4
25
20
15
10
5
0
Dial Reading, lbs
0
2
4
6
8
10
12
Degrees of Rotation
RB-13Va @ 7.4

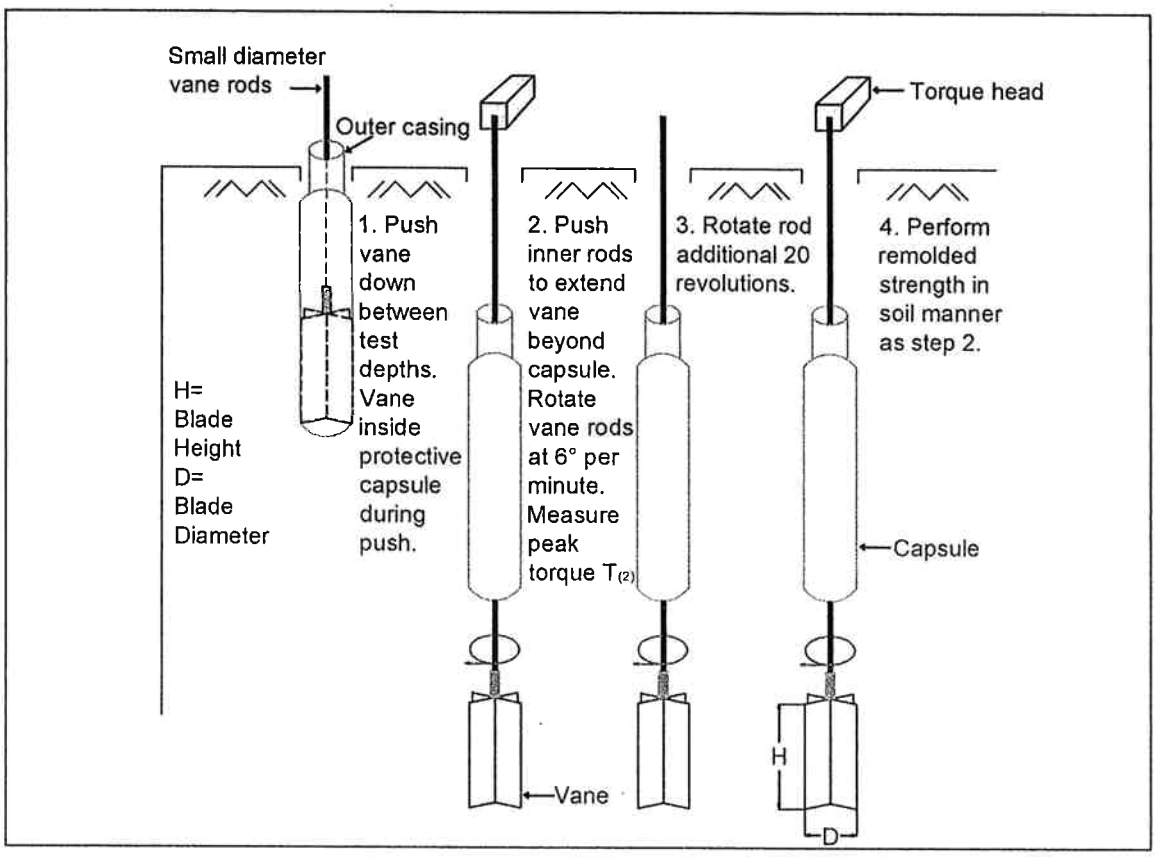

RB-13Va @ 15.7
Dial Reading, lbs
0
10
20
30
40
50
60
70
80
0
20
40
60
80
100
120
140
160
Degrees of Rotation
RB-13Va @ 15.7


RB-13Va @ 21.8
Dial Reading, lbs.
0
10
20
30
40
50
60
70
80
0
20
40
60
80
100
120
140
160
Degrees of Rotation
RB-13Va @ 21.8

Field Vane Shear Testing (FVST)

Gregg In Situ, Inc. used a H-10 Geonor vane to evaluate the in-place un-drained shear strength (s_{uv}) of soft to stiff clays & silts. A 55 by 110 mm sized vane was used for this project.

The vane is advanced to the test depth by pushing outer rods. Small diameter vane rods are then pushed to extend vane beyond the capsule. Once the vane reaches the test depth, the torque recording head is placed over and clamped onto the vane rod string. The vane rods are then loaded using the torque recording head until yielding of the surrounding soil occurs. The vane is then released from the torque recording head and is rotated clockwise twenty times with a pipe wrench to completely remold the soil. Once the soil is remolded, the torque recording head is again clamped onto the vane rods. The vane is then rotated to record the remolded strength of the soil.



A summery of the data collected is displayed in Appendix: FVST.
For further information refer to Mayne, 2002 and Greig et al. 1987.

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Copies of ASTM Standards are available through www.astm.org