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DISTRIBUTION SHEET

To	From	Page 1 of 1
Characterization Equipment Improvement	Structural Integrity Assessment	Date 04/03/95
Project Title/Work Order		EDT No. 608363
CORE SAMPLING SYSTEM SPARE PARTS ASSESSMENT WHC-SD-WM-ER-431, Rev. 0		ECN No. N/A

Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
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J. E. Corbett	R1-17	X			
T. R. Farris	S7-12	X			
T. D. Jarecki	S7-12	X			
W. W. Jenkins	S2-24	X			
A. J. Kostelinik	R1-17	X			
J. D. Potter	N1-21	X			
J. D. Robinson	H5-09	X			
K. V. Scott	H5-52	X			
J. L. Smalley	R1-17	X			
E. J. Waldo	S7-12	X			
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ENGINEERING DATA TRANSMITTAL

Page 1 of 1

1. EDT

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1	1	Cog./Proj.Eng	E. J. Walter	3/31/95	H5-52						
1	1	Cog./Proj.Eng. Mgr.	K. W. Scott	3-31-95	H5-52						
1	1	J. E. Corbett	J. E. Corbett	4/4/95	R1-17						

18. Signature of EDT Originator E. J. Walter 4/4/95		19. Authorized Representative for Receiving Organization R. J. Blanchard 4/4/95		20. Cognizant/Project Engineer's Manager K. W. Scott 4/4/95		21. DOE APPROVAL (if required) Ltr. No. ☐ Approved ☐ Approved w/comments ☐ Disapproved w/comments	

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**This document was reviewed following the
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WHC Information Release Administration Specialist:

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April 4, 1995

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7. Abstract Shortly, there will be four independently operable core sampling systems obtaining samples from the underground tanks. It is highly desirable that these systems be available for sampling during the next two years. This assessment was prepared to evaluate the adequacy of the spare parts identified for the core sampling system and to provide recommendations that may remediate overages or inadequacies of spare parts.		

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CORE SAMPLING SYSTEM SPARE PARTS ASSESSMENT

1.0 BACKGROUND

The development of the core sampling system began in the late 1970s to meet the need for obtaining samples from the underground waste tanks. Two trucks with ancillary equipment have been assembled and are in service. In the near future the third and fourth core sampling system (truck and ancillary equipment) will be complete and will join the ongoing sampling effort. To meet the sampling schedule it is necessary to maximize the availability of the core sampling systems for sampling. A critical factor in maximizing the availability is having spare parts available when needed.

2.0 OBJECTIVE

The objective is to assess the adequacy of the spare parts identified for the core sampling system and to provide recommendations that may remediate overages or inadequacies found.

3.0 SCOPE

The scope of this assessment includes Rotary Mode Core Sample Truck #3 and #4, along with the Exhauster, Nitrogen Purge Trailer, and miscellaneous equipment.

4.0 DESCRIPTION

Shortly, there will be four independently operable core sampling systems. Of the four systems, System #1 is most different. It does not operate in the rotary drill mode. The exhauster documents were a combination of #2 & #3 Systems. There are a number of differences between System #2 and the latter Systems (#3 & #4), but, for the purpose of this assessment only the #3 & #4 Systems were considered. Following is the list of design documents used in this assessment.

Exhauster, #2 System

- H-2-818186, Exhauster Assembly Rotary Mode Core Sampling
- H-2-818187, Skid Assembly Rotary Mode Core Sampling
- H-2-818189, Rotary Mode Core Sample Exhauster Skid Electrical Details
- H-2-818201, RMCS Skid Electrical Assemblies
- H-2-818202, Misc. Details Rotary Mode Core Sampling
- H-2-821605, Seal Pot Pump Assembly Rotary Mode Core Sampling
- VI #22557, Vendor information Package

Core Sampler Truck #3 & #4

H-2-690001, Sheet 1, Drawing Index (RMCST) Truck #3 & #4, (The mechanical and the electrical drawings only)

Nitrogen Trailer and Miscellaneous Equipment

Nitrogen Trailer

P-940421, dtd. 5-25-94, N₂ Vaporization system Process and Instrumentation Diagram
P.O. 4-404870-1A, Liquid Nitrogen Trailer, (Vendor Information)

Miscellaneous

H-2-81842, Hoist Cable Spray Washer Assembly Truck #2
H-2-81853, Core Sampler Support Truck #2
H-2-91671, Drill Rod Washer Ass'y. and Details
H-2-91678, Dust Cap Assembly

Nitrogen Heater

Spare Parts for Nitrogen Heater (P.O. 357168)

The hydraulic hoses, the Ford truck, and the Ford motor and drive transmission for the drill rig are not evaluated because there is a prearranged agreement to provide maintenance and repairs to these items.

5.0 APPROACH AND ASSUMPTIONS

5.1 APPROACH

The approach and sequence of activities were as follows:

- a. The objective and scope of the task were determined and identified.
- b. The function and description of the core sampling system were reviewed and roughly identified. Other design documents and studies relating to the actual performance or the projected performance were reviewed.
- c. Discussions were held with cognizant personnel to become more familiar with the system.
- d. The definition for classification of the parts selected for evaluation are provided in Table 1, Spare Parts Classification.

Table 1. Spare Parts Classification.

Spare Part Unavailability	Relative Probability of Failure		
	Low-L	Moderate - M	High - H
3 Minor	Class III		
2 Major			
1 Critical			
		Class II	
			Class I

Definition of Spare Part Unavailability

- 3 Minor - 1 day following submission of the requisition, the replacement part(s) is available for installation from on-site stores, on-site fabrication or off-site source.
- 2 Major - 1 day to 2 week following submission of the requisition, the replacement part(s) is available for installation from on-site stores, on-site fabrication or off-site source.
- 1 Critical - >2 week following submission of the requisition, the replacement part(s) is available for installation from on-site stores, on-site fabrication or off-site source.

Definition of Relative Probability of Failure

Note: Relative probability of failure is based upon a 2 year core sampling period.

- L. Low Unlikely to occur during the sampling period (<4.E-06 failures/hr)
- M. Moderate Occurrence is possible but not likely during the sampling period. (4 to 30 E-06 failures/hr)
- H. High Likely to occur during the sampling period (>30 E-06 failures/hr)

Classification

- Class I & II - An inventory of spare parts is needed.
- Class III - An inventory of spare parts is not needed.

- e. The equipment failure-rates, if available, were taken from Component Failure-Rate Data with Potential Applicability to a Nuclear-Fuel-Reprocessing Plant, DP-1663, dated July 1982, or IEEE Std. 500-1984, IEEE Guide to the Collection and Presentation of Electrical, Electronic, Sensing Component, and Mechanical Equipment Reliability Data for Nuclear-Power Generating Stations.
- f. The worksheets, which identify and classify the spare parts, were completed.
- g. A comparison of the findings of the worksheet with the actual performance of the equipment was made and adjustments were made to the spare parts accordingly.

5.2 ASSUMPTIONS

The assumptions made are as follows:

- a. For the purpose of establishing the first cut of the spare parts list it was assumed that the components (or items) are being used in the design in accordance with the manufacturer's recommendations.

6.0 FINDINGS AND COMMENTS

As noted above, parts from the sub-systems in the scope of this assessment were entered into the attached worksheets in the three attached tables and evaluated for spare part needs. The parts evaluated included those in the existing spare parts lists and additional parts selected from the design drawings considered to have significant failure potential during the design life. Attachment 1 provides the existing core sampling truck spare parts list and the existing Exhauster spare parts list is provided on Attachment 2. Drawing P-940421, Attachment 3, is marked to identify most of the Nitrogen Truck parts selected for evaluation. Each item was evaluated independently using the approach described in Par. 5.1. This initial evaluation was reviewed by the cognizant engineers and adjustments of failure classifications were made to reflect the unique equipment application or experience in the core sampling system.

The results of the evaluation were then compared with the existing spare parts list and the "Recom. Spare Parts List" column was added to the worksheet to identify: 1) Additional spare parts being recommended; 2) Spare parts on existing lists that remain in need; and 3) Spare parts on existing lists not recommended for reorder.

Because the design is likely to experience further change in response to Rotary Mode Core Sample System Availability Improvement, WHC-SD-WM-ER-415, and other developments, the spare parts list needs to change with design changes.

7.0 RECOMMENDATIONS

1. Refer to the "Recom. Spare Parts Status" field in Tables 2, 3, and 4 and maintain a minimum inventory of "1 each" for each item identified with "R" or "ER".
2. Revise the worksheets in the Tables to correspond with design changes in the system, as they occur.

TABLE 2
EXHAUSTER
CSS SPARE PARTS EVALUATION

3/31/95

--- None
R Recommended (on existing SP List)
ER Not Recommended (on existing SP List)

Item	Drawing Number	P/N	Description	Most Likely Failure & Cause	Failure Effects to Core Sampling	Fail Det Visual Alarm Instrm	Spare Part 1-Crit 2-Major 3-Minor	Part Fail L-Low M-Med H-High	Fail Class I, II, III	Recomm Spare Parts Status	Remarks
001	H 2-818186	29	Self Contained Air Mover (VI #22557)	Blower/Motor bearing fails	Exhauster shut down	I.A	2	M	II	---	8 3E-06 *COG Input
002A	H-2-818186	30	Hoffman Box Instrument Cabinet (VI #22557)	This item contains O2AA thru O2AW							
002AA	Exh SP List (Att. 2)	5	Rosemount Analytical Model 400A total hydrocarbon analyzer. Analyzer matrix: 5001-0010-1000	Analyzer output is erratic. ignition failure	Exhauster not available	I	1	H	I	ER	3 45E-03
002AB	Exh SP List (Att. 2)	6	Brüel and Kjaer Type 1302 multi gas monitor	Electrical failure, no output. Chopper belt breaks	Exhauster not available	I	1	H	I		3 45E-03
002AC	Exh SP List (Att. 2)	7	Eberline Alpha 6A-1 Alpha monitor	Out of Calibration	No effect for 72 hrs then not available	I.A	1	H	I	ER	15E-06
002AD	Exh SP List (Att. 2)	8	Eberline AMS-4 Beta Monitor	Out of Calibration. Detector fails	No effect for 72 hrs then not available	I.A	1	H	I	ER	15E-06
002AE	Exh SP List (Att. 2)	9	Air Dimensions Inc Model MM01310V sample pump.	Diaphragm fails	Exhauster not available	I.A	2	M	III*	NR	2 7E-05 *COG Input
002AF	Exh SP List (Att. 2)	12	Stack Massflow Transmitter (Includes: TT-1 DC-1, FY-1, and FI-1) (FT-1, MASS-tron (I.D. Code))	Electric failure, no output	Items are in the Sample Flow Loops. No effect for 72 hrs then exhauster isn't available	I.A	1	M	II	ER	5 95E-06
002AG	Exh SP List (Att. 2)	13	Sample Massflow Transmitter (Includes: TT-2, -3, -4, DC-2, -3, -4, PT-2, -3, -4, FY-2, -3, -4, FI-2, -3, -4)	Electric failure, no output	Items are in the Sample Flow Loops. No effect for 72 hrs then exhauster isn't available	I.A	1	M	II	ER	5 95E-06

TABLE 2
EXHAUSTER
CSS SPARE PARTS EVALUATION

3/31/95

None
Recommended
R
ER
NR
Not Recommended (on existing SP List)

Item	Drawing Number	P/N	Description	Most Likely Failure & Cause	Failure Effects to Core Sampling	Fail Det Visual Alarm Instrm	Spare Part 1-Crit 2-Major 3-Minor	Part Fail L-Low M-Med H-High	Fail Class I. II. III	Recomm Spare Parts Status	Remarks
002AJ	Exh SP List (Att. 2)	14	Manifold Vacuum Pressure Control Valve with Actuator 3/4" 3-Way (PCV-5 Delta (Belimo) 75-3-	Mechanical failure. Controller fails	Items are in the Sample Flow Loops. No effect for 72 hrs then exhauster isn't available	A	2	L	III	NR*	6.8E-05 *COG Input
002AI	Exh SP List (Att. 2)	15	Sample Flow Control Valves with Actuator (1/2" 2-Way) (FCV-2-3-4 Delta (Belimo) 05-2-10SS/SM24SR)	Mechanical failure. Controller fails	Items are in the Sample Flow Loops. No effect for 72 hrs then exhauster isn't available	A	2	L	III	NR*	6.8E-05 *COG Input
002AJ	Exh SP List (Att. 2)	16	Manifold Vacuum Pressure Transmitter (Includes: P1-5) (PT-5 VEL-trol 5000AZ)	Electric failure	Items are in the Sample Flow Loops. No effect for 72 hrs then exhauster isn't available	I.A	2	M	II	ER	5.95E-06
002AK	Exh SP List (Att. 2)	17	Vacuum Pump Intake Isolation Control Valve with Actuator (3/4" 3-Way) (ICV-6 Delta (Belimo) 75-	Controller fails. Mechanical failure	Items are in the Sample Flow Loops. No effect for 72 hrs then exhauster isn't available	A	2	M	II	NR*	2.7E-05 *COG Input
002AL	Exh SP List (Att. 2)	18	Vacuum Pump Exhaust Isolation Control Valve with Actuator (1" 3-Way) (ICV-7 Delta (Belimo) 1-3-	Controller fails. Mechanical failure	Items are in the Sample Flow Loops. No effect for 72 hrs then exhauster isn't available	A	2	M	II	NR*	2.7E-05 *COG Input
002AM	Exh SP List (Att. 2)	19	Vacuum Relief Valve 5-27" Hg (VRV-1.2 Gast. AA 840A)	Controller fails. Mechanical failure	Items are in the Sample Flow Loops. No effect for 72 hrs then exhauster isn't available	A	2	M	II	NR*	1E-05 *COG Input
002AN	Exh SP List (Att. 2)	20	Exhaust Fan On/Off Status Relay (2PDT) (K-1 IDEC. RY2S-U-AC24V)	Mechanical failure of relay	Exhauster shut down		2	M	II	ER	9E-05
002AO	Exh SP List (Att. 2)	21	Pump Start Relays (2PDT) (K-2 K-3 IDEC. RN2B-U-AC24V)	Mechanical failure of relay	No effect for 72 hours		2	L	III	NR	1.01E-06
002AP	Exh SP List (Att. 2)	22	Vacuum Pump Intake Filter/Muffler (Attaches at PCV-5 Allied Witan. FS Type 4-44 Model F-10)	Falls apart from rust	None	V	2	L	III	NR	1.2E-06

TABLE 2
EXHAUSTER
CSS SPARE PARTS EVALUATION

3-31-95

--- None
R Recommended
ER Recommended (on existing SP List)
NR Not Recommended (on existing SP List)

Item	Drawing Number	P/N	Description	Most Likely Failure & Cause	Failure Effects to Core Sampling	Fail Det Visual Alarm Instrm	Spare Part 1-Crit 2-Major 3-Minor	Part Fail L-Low M-Med H-High	Fail Class I II III	Recomm Spare Parts Status	Remarks
002A0	Exh SP List (Att 2)	23	Ribbon Cart. Idge (Chessel Recorder) (Used with DL-1 Chessel, LA243101)	Runs out of ink	Exhauster not available	V.I	2	H	II	---	Consumable
002AR	Exh SP List (Att. 2)	24	Giant paper, Z-fold (Chessel Recorder) (Used DL-1 Chessel, GD2411010)	Paper wet	Exhauster not available	V.I	2	H	II	---	Consumable
002AS	Exh SP List (Att 2)	25	2 Amp Pico Fuse (Used with FT-1, -2, -3, -4 AMC, 205-036-00)	Electrical power surge	Items are in the Sample Flow Loop. No effect for 72 hrs. then unavailable	I.A	2	M	II	NR*	5E-06 *COG Input
002AT	Exh SP List (Att. 2)	26	1 Amp Pico Fuse (Used with FT-1, -2, -3, -4 AMC, 205-843-00)	Electrical power surge	Items are in the Sample Flow Loop. No effect for 72 hrs. then unavailable	I.A	2	M	II	NR*	5E-06 *COG Input
002AU	Exh SP List (Att. 2)	27	1/8" Amp Pico Fuse (Used with FT-1, -2, -3, -4 AMC, 205-374-00)	Electrical power surge	Items are in the Sample Flow Loop. No effect for 72 hrs. then unavailable	I.A	2	M	II	NR*	5E-06 *COG Input
002AV	Exh SP List (Att. 2)	28	1.5 Amp Pico Fuse (Used with PT-5, AMC, 205-035-00)	Electrical power surge	Items are in the Sample Flow Loop. No effect for 72 hrs. then unavailable	I.A	2	M	II	NR*	5E-06 *COG Input
002AW	Exh SP List (Att. 2)	29	1.6 Amp Fuse, 3AG (Used with FT-1, -2, -3, -4, PT-5, AMC, 205-056-00)	Electrical power surge	Items are in the Sample Flow Loop. No effect for 72 hrs. then unavailable	I.A	2	M	II	NR*	5E-06 *COG Input
003A	H-2-818186	32	Heater Housing Assembly (VI #22557)	Heater fails, excessive temperature	None immediately. Depending on tank & weather, Exhauster shutdown	A	2	L	III	---	
004A	H-2-818186 (Att 2 #10)	33	Switch/Gage, Magnehelic (MODEL #2005)	Mechanical failure due to condensate formation	None	V	2	M	II	ER	1.6E-05

TABLE 2
EXHAUSTER
CSS SPARE PARTS EVALUATION

3/31/95

None
Recommended
ER Recommended (on existing SP List)
NR Not Recommended (on existing SP List)

Item	Drawing Number	P/N	Description	Most Likely Failure & Cause	Failure Effects to Core Sampling	Fail Det Visual Alarm Instrm	Spare Part 1-Crit 2-Major 3-Minor	Part Fail L-Low M-Med H-High	Fail Class I II III	Recomm Spare Parts Status	Remarks
005A	H-2-818186 (Att. 2 #11)	34	Switch/Gage, Photohelic (MODEL #3010)	Mechanical failure due to condensate formation	None	V	2	M	II	ER	1 6E-05
006A	H-2-818186	35	Switch/Gage, Photohelic (MODEL #3310)	Mechanical failure due to condensate formation	Shutdown	A.V	2	M	II	ER	1 6E-05
007A	H-2-818186	41	Regulator/Valve H2 In Air (3102-590)	Set fails from overtightening	Exhauster not available	I	2	L	III	---	2 14E-06
008A	H-2-818186	42	Regulator, Pressure (Oxygen) (0020-6900-110)	Set fails from overtightening	Exhauster not available	I	2	L	III	---	2 14E-06
009A	H-2-818186	43	Light, Strobe, Red (94R-N5)	Bulb out from excessive use	Increased operator responsibility	V	2	M	II	R	5 0E-06
010A	H-2-818186	49	Transmitter, Humidity/Temp (MODEL #HX12C/N)	Fails from exposure to excessive moisture	None immediately Depending on tank & weather, Exhauster shutdown	A	1	L	III	---	8 9E-07
011A	H-2-818186	53	Ducting, 10" black (DT 60 MIL)	Ducting tears from weather & handling	Exhauster shut down	V	2	L	III	---	4 0E-06
012A	H-2-818186	55	Duct, Flexible Connection 8"	Ducting tears from weather & handling	Exhauster shut down	V.I.A	3	L	III	---	4 0E-06
013A	H-2-818186	57	Thermostat, NEMA 4X Enc1 (AMC-1A)	Electrical failure, no output	No effect in warm weather shut down in winter	V	2	L	III	---	2 81E-06

TABLE 2
EXHAUSTER
CSS SPARE PARTS EVALUATION

3/31/95

--- None
R Recommended
ER Recommended (on existing SP List)
NR Not Recommended (on existing SP List)

Item	Drawing Number	P/N	Description	Most Likely Failure & Cause	Failure Effects to Core Sampling	Fail Det Visual Alarm Instrm	Spare Part 1-Crit 2-Major 3-Minor	Part Fail L-Low M-Med H-High	Fail Class I II III	Recomm Spare Parts Status	Remarks
014A	H-2-818201	8	Variable Speed Drive, 480V (1336-80075-ECD)	Fails from incorrect power supply/static changes	Exhauster shut down	I, A	1	M	II	---	5E-06 *COG Input
014AA	Exh SP List (Att. 2)	1	Interface card, Allen Bradley #1335-MOD-L3	These items are addressed in 014A			2	M	II	ER	2.36E-05
014AB	Exh SP List (Att. 2)	2	Main control board, Allen Bradley #SP-120659	These items are addressed in 014A			2	M	II	ER	2.36E-05
014AC	Exh SP List (Att. 2)	3	Power supply card, Allen Bradley #SP-151133	These items are addressed in 014A			2	M	II	ER	2.36E-05
014AD	Exh SP List (Att. 2)	4	Universal controller, Yokogawa Model UT 37 1/4 DIN, With T/C, MV, V, RTD inputs, 4-20 MADC output	Physical damage from handling	Exhauster shut down		2	L	III	ER*	*COG Input
015A	H-2-818201	9	Safety Switch, 600V, 3 Wire (H361RB)	Excessive Moisture rusts contacts switch breaks	Exhauster shut down	V	3	M	III	---	1.87E-05
016A	H-2-818201	10	Fuse, 600V, 15 Amp (NOS - 15)	High current	Exhauster shut down	V	3	M	III	---	5.0E-06
017A	H-2-818201	13	Transformer, 15KVA, 3 Phase, 60HZ (Y48D28115N)	Poor input power results in high temperature	Exhauster shut down	V	1	L	III	---	1.44E-06
018A	H-2-818201	45	Fuse, Limitron Fast Acting 600V, 1 1/2 Amp (KTK-R-1 1/2)	Burn out from excessive current	Exhauster shut down	V	3	L	III	---	5.0E-06

4/03/95

TABLE 2
EXHAUSTER
CSS SPARE PARTS EVALUATION

None
--- Recommended (on existing SP List)
R ER Recommended (on existing SP List)
NR Not Recommended (on existing SP List)

Item	Drawing Number	P/N	Description	Most Likely Failure & Cause	Failure Effects to Core Sampling	Fail Det Visual Alarm Instrm	Spare Part 1-Crit 2-Major 3-Minor	Part Fail L-Low M-Med H-High	Fail Class I, II, III	Recomm Spare Parts Status	Remarks
019A	H-2-818201	47	Transformer Control 1 Phase, 480/120 (X183222)	Burns out from incorrect input power	Exhauster shut down	I, A	2	L	III	---	6.24E-07
020A	H-2-818201	48	Relay, 4PDT, 120V (KHAU-17A18-120)	Excessive voltage mechanical failure	Increased operator responsibility	I	3	L	III	---	4.9E-06
021A	H-2-821605	11	Pump, Fixed Flow (L-07002-60)	Causing ruptures due to freeze protection not on	No immediate effect. Increased operator awareness will be required		2	L	III	R	1.4E-06
022A	H-2-821605	12	Relay, Gen Purpose (KRP11AG-120)	High voltage input cause mechanical failure	No immediate effect. Increased operator awareness will be required		3	L	III	---	2.0E-06
023A	H-2-821605	22	Level Switch, Teflon Insul, 120V, W/18" Sensing Probe (#7000-T-120-I-18-6)	Rough handling leads to housing cracking, water gets inside	No immediate effect. Increased operator awareness will be required		2	M	II	R	5.85E-06

TABLE 3
CORE SAMPLING TRUCK
CSS SPARE PARTS EVALUATION

3/31/95

--- None
R Recommended
ER Recommended (on existing SP List)
NR Not Recommended (on existing SP List)

Item	Drawing Number	P/N	Description	Most Likely Failure & Cause	Failure Effects on the Core Sampling Operation	Fail Det Visual Alarm Instrm	Spare Part 1-Crit 2-Major 3-Minor	Part Fail L-Low M-Med H-High	Fail Class I II III	Recomm Spare Parts Status	Remarks
001A	H-2-690011	8	Jack, Hydraulic Leveling (Longyear E37996)	Hydraulic Cylinder seals are overpressuring & leak	Orientation of truck is disrupted	V	1	L	III	---	
002A	H-2-690013	5	Air Compressor (Thomas Industries Inc. Ultra Air Pac Model #T150ST, 1.5 hp)	Air compressor has a mechanical failure	Footclamp cannot be operated, sampling stops	V	2	M	II	R	Many air compressors available as temp substitute
003A	H-2-690014	11	Gauge, Pressure, 0-600 psi, 6 inch dial, rear flg mt, liquid filled (NOSHOK 60-500-600)	Pulsating pressure fails the gauge	Gauge is redundant to digital information - no short-term effect	V.I	2	M	II	ER	10E-6
004A	H-2-690014	12	Transducer, pressure, Model TJE, 0-300 psig, 1/4 NPT, 0-5V output (SENSOTEC AP121CP-6B-2C-1E-5B)	Sensor fails - no output	Unable to measure downward force (safety envelope) drilling stops	I.A	1	H	I	ER	35E-06
005A	H-2-690014	20	Valve, Flow Control, 3/4 NPT female, 25 GPM (Parker Hannifin Co. F1200)	The valve fails to modulate. It sticks in position	Unable to control drill movement, sampling stops	V.I	2	M	II	ER	8.5E-06
006A	H-2-690014	21	Valve, Pressure Reducing, 3/4, 100-3000 psi (Parker Hannifin Co. PRC101S10-8T)	Valve leaks thru the seat - does not reduce pressure at low flow	Improper operation of Sov-11, sampling stops	V	2	M	II	ER	2.14E-06 (8 ea)
007A	H-2-690014	22	Valve, Check (Parker Hannifin Co. C43T)	Worn or stuck disc	Improper operation of Sov-12, sampling stops	V	3	M	III	---	4.6E-06
008A	H-2-690015	8	Gauge, 0-3000 psi, 4 inch, 1/2 NPT, bottom MT (ASHCROFT 45137902L, 0/3000 psi)	Gauge indications is erroneous due to vibration or shock	Gauge used for maintenance and troubleshooting-no effect	V	2	M	II	R	10E-6
009A	H-2-690015	40	Valve, Check (Parker CDP101P-8T)	Valve sticks & allows back flow	Unable to traverse drill rig, sampling stops	V	2	M	II	R	4.6E-06

TABLE 3
CORE SAMPLING TRUCK
CSS SPARE PARTS EVALUATION

3-31/95

---	None Recommended
R	Recommended (on existing SP List)
ER	Not Recommended (on existing SP List)
NR	

Item	Drawing Number	P/N	Description	Most Likely Failure & Cause	Failure Effects on the Core Sampling Operation	Fail Det Visual Alarm Instrm	Spare Part 1-Crit 2-Major 3-Minor	Part Fail L-Low M-Med H-High	Fail Class I, II, III	Recomm Spare Parts Status	Remarks
010A	H-2-690015	41	Valve, Four way, Double Solenoid (Parker D3W1CNYC-14)	Valve sticks in position due to a dirty system	Unable to move shielded receiver, sampling stops	V	2	H	II	R	30E-06 or 1 0E-03 DM
011A	H-2-690015	42	Valve, Four way, Double Solenoid with Conduit Box (Parker D3W1CNYC114)	Valve sticks in position due to a dirty system	Unable to slew drill rig, use of traverse and rotation would allow continued sampling	V	2	H	II	R	30E-06 or 1 0E-03 DM
012A	H-2-690015	43	Valve, Four way, Single Solenoid (50V 13) (Parker D3W1FNYC-14)	Valve sticks in position due to a dirty system	Unable to control hydraulics, sampling stops	V	2	H	II	R	30E-06 or 1 0E-03 DM
013A	H-2-690015	44	Valve, Four way, Double Solenoid (Parker D3W4CNYC-14)	Valve sticks in position due to a dirty system	Unable to traverse drill rig, sampling stops	V	2	H	II	R	30E-06 or 1 0E-03 DM
014A	H-2-690015	45	Valve, Check (Parker CPOM30)	Valve seat wears & allows back flow	Unable to traverse drill rig, sampling stops	V	2	M	II	R	4 6E-06
015A	H-2-690015	46	Valve, Flow Control (Parker FM3000)	Valve wears & function is degraded	Unable to move shielded receiver, sampling stops	V	2	M	II	R	8 5E-06
016A	H-2-690015	50	Valve, Counterbalance, (ADJ 500-3500 psi) (Parker RDC 103S35-8T)	Valve collects dirt & freezes in position	Unable to move shielded receiver, sampling stops	V	2	M	II	R	8 5E-06
017A	H-2-690015	100	Proportional Directional Control Valve (Parker D31F1E01CC4NF00)	Valve sticks due to dirt & debris	Unable to control rotation, sampling stops	V	2	M-H	II	ER	8 5E-06
018A	H-2-690015	101	Valve, Pressure Reducing (Parker, PRM3PP-07K)	Valve fails internally & does not maintain a reduced pressure	Unable to move shielded receiver sampling stops	V	2	L	III	---	2 14E-06

TABLE 3
CORE SAMPLING TRUCK
CSS SPARE PARTS EVALUATION

--- None
R Recommended (on existing SP List)
ER Recommended (on existing SP List)
NR Not Recommended (on existing SP List)

Item	Drawing Number	P/N	Description	Most Likely Failure & Cause	Failure Effects on the Core Sampling Operation	Fail Det Visual Alarm Instrm	Spare Part 1-Crit 2-Major 3-Minor	Part Fail L-Low M-Med H-High	Fail Class I II III	Recomm Spare Parts Status	Remarks
019A	H-2-690017	3	Hydraulic Jack (E37996 Longyear, Salt Lake City, Utah)	Hydraulic cylinder seals are overpressurized & leak	Orientation of the truck is disrupted, sampling stops	V	1	L	III	---	
020A	H-2-690020	23	Motor, DC PN3268 W/Motor Foot (Danfoss Electronics)	Motor fails due to an internal short	Unable to position RLU, Sampling Stops	I	2	H	II	ER	76E-06
021A	H-2-690020	28	Flex Coupling PN 5-11, 1 & 3/4 Bores (Lovejoy Mfg)	Physical failure, Material defect	Unable to position RLU, Sampling Stops	I	2	L	III	---	6.88E-07
022A	H-2-690020	67	Brake, MFSB-42-16 Coil #1, Style I (Electroid Corp)	Wear pads are expanded & do not function	Unable to position RLU, Sampling Stops	I	2	M	II	ER	12E-06
023A	H-2-690020	68	Shaft, Flexible, 325 W/ Casing, PN 15573-803 X 18 L X 1/4 X 3/8 (STOW Manufacturing Co)	Shaft breaks	Unable to position RLU, Sampling Stops	I	2	L	III	---	1.67E-06
024A	H-2-690021	13	Line Conditioner, Hard Wired 1 KVA 120V/240V, 60 Hz Noise Reduction 120db (General Electric)	Internal short or open	Partial loss of control console instrumentation, sampling stops	I	2	L	III	NR	1.2E-06
025A	H-2-690021	15	Thermostat, SPST, Close on rise 90-130 deg F (Granger Stock # 4E116)	Switch does not close	Fan does not cool, Instr fails, Sampling stops	I	2	L	III	---	2.18E-06
026A	H-2-690021	19	Fuse, 1 Amp, Fast Acting (Littelfuse 312001)	Fuse opens from power surge	Partial loss of control console instrumentation, sampling stops	I	3	M	III	---	5E-06
027A	H-2-690021	25	Mulfan Fan, 115VAC, 60Hz, 105 CFM, Type MU2A1 (ROIRON 028021)	Fan stops - bearing freezes	Partial loss of control console instrumentation, sampling stops	I	2	H	II	R	90E-06

TABLE 3
CORE SAMPLING TRUCK
CSS SPAPE PARTS EVALUATION

3/31/95

--- None
R Recommended
ER Recommended (on existing SP List)
NR Not Recommended (on existing SP List)

Item	Drawing Number	P/N	Description	Most Likely Failure & Cause	Failure Effects on the Core Sampling Operation	Fail Det Visual Alarm Instrm	Spare Part 1-Crit 2-Major 3-Minor	Part Fail L-Low M-Med H-High	Fail Class I. II. III	Recomm Spare Parts Status	Remarks
028A	H-2-690023		3" Ball Valve Modification (RMCST)	Ball valve leaks. Particulates are embedded in the seals	Potential Contamination issue, sampling stops	V, I	I	L	III	---	
029A	H-2-690027	14	Assault Mask Filter Cartridge (Scott no. 642- OVH OR 542-AGH, Scott Aviation Safety & Supply)	Filter clogs from normal use	No effect, however filter rupture would cause sampling to stop	V	2	H	II	R	
030A	H-2-690030	27	Timing Belt (Stock Drive Products 6R3-180037)	Timing belt gets loose & slips	Unable to position RLU, sampling stops	I	2	L	III	---	3 8E-06
031A	H-2-690030	29	Switch, Interlock (MICRO BZ-2RW805551-AZ)	Contacts stick closed	Unable to position RLU, sampling stops	I	2	L	III	---	1 5E-06
032A	H-2-690030	31	Load Cell 0-500 lb (Dillon/Qual Plus Model Z 33565-0164 with connector)	Internal electric failure	Unable to position RLU, sampling stops	I	1	H	I	ER	4 28E-04
033A	H-2-690030	32	Encoder (BEI 924-01002-5555)	Internal electric failure	Unable to position RLU, sampling stops	I	2	L	III	NR	3 0E-07
034A	H-2-690030	35	Slip Ring (Meridian Laboratory ROTOCOM Model No MX0-2)	Slip Ring catches, does not slip	Unable to position RLU, sampling stops	I	2	L	III	NR	6 8E-07
035A	H-2-690032	6	Spring (F5500-063-20005, Associated Spring)	Spring breaks, a tangled mess ensues	Unable to position RLU, sampling stops	I	3	M	III	---	
036A	H-2-690035	9	Pressure Regulator, w/ gauge, 0-125 psig range, pressure rating 250 psig, 0-160 psig gauge scale	Regulator leaks thru the seat	Unable to regulate breathing air on truck. Operators must use alternate source	V	2	L	III	NR	2 14E-06

TABLE 3
CORE SAMPLING TRUCK
CSS SPARE PARTS EVALUATION

3/31/95

--- None
R Recommended
ER Recommended (on existing SP List)
NR Not Recommended (on existing SP List)

Item	Drawing Number	P/N	Description	Most Likely Failure & Cause	Failure Effects on the Core Sampling Operation	Fail Det Visual Alarm Instrm	Spare Part 1-Crit 2-Major 3-Minor	Part Fail L-Low M-Med H-High	Fail Class I, II, III	Recomm Spare Parts Status	Remarks
037A	H-2-690035	10	Filter, with manual drain, rated 99.97% of particles 3 microns or > .25 cfm min cap. 1/2 FNPT.	Filter media separates & integrity is lost	Unable to regulate breathing air on truck. Operator's must use alternate source	V	1	L	III	---	1.3E-06
038A	H-2-690038	1	Remote Latch unit Assembly (RMCT)	Bearing freezes up due to misalignment	Unable to operate RLU. sampling stops	I	1	H	I	ER	
039A	H-2-690038	17	Motor (modified) (Labinal Globe Motor Div PN 43A-152-12)	Motor bearing wears excessively & motor stalls	Unable to operate RLU. sampling stops	I	2	H*	I	ER	4E-06 *COG Input
040A	H-2-690038	18	O-Ring (Parker Hannifin PN 2-212-ES40-80)	Debris between o-ring & housing allow leakage	Unable to operate RLU. sampling stops	I	3	L	III	---	2.0E-07
041A	H-2-690043	30	Extension Spring (Associated Spring #ED120-018-1250)	Installation or maintenance causes inadvertent spring damage	Unable to rotate platform. sampling stops	V	3	L	III	---	1E-06
042A	H-2-690043	31	Limit Switch (Micro Switch DTF2-2RN2-LH)	Contacts stick closed	Unable to rotate platform. sampling stops	V	3	L	III	NR	1.5E-06
043A	H-2-690040	32	Limit Switch (Micro Switch DTF2-2RN2-RH)	Contacts stick closed	Unable to rotate platform. sampling stops	V	3	L	III	NR	1.5E-06
044A	H-2-690043	8	Hydraulic Cylinder 2 1/2 inch bore. 42 inch stroke	Hydraulic cylinder is overpressurized & seals leak	Sampling may continue but downward force may be limited	V.I	2	L	III	---	
045A	H-2-690043	12	Drill Rig (34TV2N diamond drill rig w/ GF13 (35 hp Ford gas motor & torque converter. #26073-MOD-1175)	Drilling rig fails to function	All hydraulic operations stop. truck immobilized	V.I	3	H	III	---	Longyear stocks all parts expected to fail

TABLE 3
CORE SAMPLING TRUCK
CSS SPAKE PARTS EVALUATION

3-31-95

--- None
R Recommended
ER Recommended (on existing SP List)
NR Not Recommended (on existing SP List)

Item	Drawing Number	P/N	Description	Most Likely Failure & Cause	Failure Effects on the Core Sampling Operation	Fail Det Visual Alarm Instrum	Spare Part 1-Crit 2-Major 3-Minor	Part Fail L-Low M-Med H-High	Fail Class I, II, III	Recomm Spare Parts Status	Remarks
046A	H-2-690046	9	Bearing, Econo-Track (ROTEK L6-43N97)	Bearing operates roughly due to corrosion or wear	Rotation speed lowered, slows sampling operations	V	2	L	III	---	
047A	H-2-690052	1	Grapple Hoist Rotary Valve Actuator	Clasp does not work freely. Sticks in open position	Unable to operate grapple, sampling stops	I	1	H	I	ER	
048A	H-2-690052	16	Spring Extension (Associated Spring E0120-016-1500 SST)	Spring breaks	Unable to operate grapple, sampling stops	I	3	L	III	---	1E-06
049A	H-2-690052	17	Spring Compression, Extra Heavy (Lee Spring-Modified before installation, cut spring to 1 9. 1HL-1000A-6)	Spring breaks	Unable to operate grapple, sampling stops	I	3	L	III	---	1E-06
050A	H-2-690053	8	Magneto Tachometer Generator with 1-20 step-up gearbox & 16 tooth 16p drive pinion (Inst & cntrl)	No Output	Unable to measure drill rpm (safety envelope) drilling stops.	A	2	M	II	ER	5E-06, 1 67E-06, 2E-06
051A	H-2-690053	26	Bellow, Sewn (BLK BUNA-N/NYLON +- 5 DURO) (Minor Rubber Co Inc 7FS-2309 sht 3)	Bellows rip at seam. Thread fails from use	Loss of protection against weather. Increased chance of inner bellows failure	V	1	M	II	R	2 24E-06
052A	H-2-690054	5	Logic Magnetic Pickup, Emitter follower, 3-pin connector (RFD Lion controls PN LMPEC000	Electric failure no output	Unable to operate grapple, sampling stops	I	2	M	II	ER	5E-06 (Tachometer)
053A	H-2-690055	19	Motor, 3/4 hp, 1725 rpm, 90VDC, NEMA 56C Frame, Shunt Wound (General Electric 58C056R0397)	Bearing malfunction causes overload shutdown	Unable to operate grapple, sampling stops	I	2	M	II	ER	1 98E-05
054A	H-2-690055	20	Holding Brake, Spring Set 56C Frame (DYNACORP Emerson Power Transmission Corp SSBP-56-6)	Spring fails - braking is lost	Unable to operate grapple, sampling stops	I	2	M	II	ER	4 27E-06

TABLE 3
CORE SAMPLING TRUCK
CSS SPARE PARTS EVALUATION

3/31/95

--- None
R Recommended
ER Recommended (on existing SP List)
NR Not Recommended (on existing SP List)

Item	Drawing Number	P/N	Description	Most Likely Failure & Cause	Failure Effects on the Core Sampling Operation	Fail Det Visual Alarm Instrm	Spare Part 1-Crit 2-Major 3-Minor	Part Fail L-Low M-Med H-High	Fail Class I, II, III	Recomm Spare Parts Status	Remarks
055A	H-2-690055	23	Counter, Mechanical Totalizing (DYNAPAR/VEEDER-ROOT 112935-005)	Electric failure	Unable to operate grapple, sampling stops	I	2	L	III	---	3.49E-06
056A	H-2-690055	26	Transducer Cable Extension and Velocity (Celeco Transducer Products Inc PT8510-0030-111-1110)	Electrical short	Unable to operate grapple, sampling stops	I	2	M	II	ER	8.7E-06 (Transducer)
057A	H-2-690057	13	Wire Rope Assy (See note 8 on Drawing)	Wire rope frays catches & jumps off travelling pulley	Unable to operate grapple, sampling stops	I	2	H	II	ER	
058A	H-2-690057	40	Load Cell, Miniature (SENSOTEC AL311)	Electric failure internally - no output	Unable to operate grapple, sampling stops	I	1	M	II	ER	4.28E-06
059A	H-2-690057	41	Seal, Block Vee, Viton, 1" dia (CR Seal, #7211529)	Seal wears & allows leakage	Potential contamination issue, drilling stops	V, I	2	L	III	---	3E-06
060A	H-2-690059	22	Outer Bellows, Neoprene 50 Duro, Black (Minor Rubber Inc) (SK-51193-MH)	Bellows rip at seam Thread fails from use	Loss of protection against weather, increased chance of inner bellows failure	V	1	M	II	R	2.24E-06
061A	H-2-690059	23	Inner Bellows (Metal Fab Corp) (00-1450-008)	Metal seam cracks from fatigue stressing	Loss of purge gas containment, drilling stops	V, I, A	1	H	I	R	Design life is 10,000 complete cycles
062A	H-2-690060	45	Oxygen Monitor, 120 VAC (Davis Instruments IL92501 Model 335)	O2 Monitor output is erroneous - faulty sensor	Monitor gives indication of N2 leak but is not required for sampling	I	2	H	III*	---	O2 Analyzer - 6.45E-04, *COG input
063A	H-2-690060	48	Light, Strobe, Heavy Duty, Blue (Edwards Div 94B-N5)	The strobe light fails, Electrical failure	Light is redundant to audible alarm - no short-term effect	V	3	M	III	---	8E-06

TABLE 3
CORE SAMPLING THICK
CSS SPARE PARTS EVALUATION

3/31/95

---	None
R	Recommended
ER	Recommended (on existing SP List)
NR	Not Recommended (on existing SP List)

Item	Drawing Number	P/N	Description	Most Likely Failure & Cause	Failure Effects on the Core Sampling Operation	Fail Det Visual Alarm Instrum	Spare Part 1-Crit 2-Major 3-Minor	Part Fail L-Low M-Med H-High	Fail Class I II III	Recomm Spare Parts Status	Remarks
064A	H-2-690062	7	Valve, Check 3/8 NPT (Circle Seal 2259T1-3MM-15 CV-1.2)	Valve wears & allows back flow	Potential contamination issue, sampling stops	V.I	2	M	II	R	4.68E-06
065A	H-2-690062	8	Valve, Check 3/4 (Circle Seal 2359R-6PP CV-3)	Valve wears & allows back flow	Potential contamination issue, drilling stops	I	2	M	I	R	4.68E-06
066A	H-2-690062	9	Valve, Pressure Regulator 3/4 (Parker 072413A, PR-1)	Valve leaks thru seat	Potential contamination issue, drilling stops	I	2	L	III	NR	2.16E-06
067A	H-2-690062	10	Valve, Pressure Regulator 1/4 FNPT (McMaster-Carr 4956k1, PR-2.3)	Valve leaks thru seat	Potential contamination issue, sampling stops	I	2	L	III	NR	2.16E-06
068A	H-2-690062	11	Valve, Solenoid 2 Pos. 3 way, NC, Man. Override, 3/4 (Parker N315-65-04853P)	Solenoid fails electrically	Unable to establish purge gas/hydrostatic head, sampling stops	I.A	2	H	II	ER	30E-06
069A	H-2-690062	12	Valve, Solenoid 2 Pos. 3 way, NC, Man. Override, 3/8 (Parker CKJ13701)	Solenoid fails electrically	Unable to establish purge gas/hydrostatic head, sampling stops	I.A	2	H	II	ER	30E-06
070A	H-2-690062	13	Valve, Pressure Relief, 1" (Circle Seal D533T1-8M-140)	Valve lifts off seat, then does not fully reset - leaks continuous	Unable to establish purge gas/hydrostatic head, sampling stops	I	2	L	III	---	2.5E-06
071A	H-2-690062	14	Valve, Needle Flow Control, 1" (Parker MW1600S)	Dirt in system wears the seat & limits the ability to control	Unable to establish purge gas/hydrostatic head, sampling stops	I	2	M	II	ER	6.4E-06
072A	H-2-690062	15	Valve, Flow Control, 1/2 (Whitey SS-1RS8)	Valve leaks at stem	Potential contamination issue, sampling stops	V	3	M	III	NR	6E-07

TABLE 3
CORE SAMPLING TRICK
CSS SPARE PARTS EVALUATION

3/31/95

--- None
R Recommended
ER Recommended (on existing SP List)
NR Not Recommended (on existing SP List)

Item	Drawing Number	P/N	Description	Most Likely Failure & Cause	Failure Effects on the Core Sampling Operation	Fail Det Visual Alarm Instrm	Spare Part 1-Crit 2-Major 3-Minor	Part Fail L-Low M-Med H-High	Fail Class I II III	Recomm Spare Parts Status	Remarks
073A	H-2-690062	16	Flowmeter, Turbine, 1 1/4 (Hoffer Flow Controls HO 1 1/4 X 1 1/4-30-B-IM-MS)	Turbine wears, then sticks in a position	Triple redundant, no effect with 1 failure	I	1	H	I	---*	2.49E-04 *COG Input
074A	H-2-690062	19	Gage, Pressure 0-160 psi (Aschcroft 35-1009SW-02L-160 psi)	Gage reads erratic, vibration causes internal wear	Redundant gauge, no effect	I	2	M	II	ER	10E-06
075A	H-2-690062	20	Gage, Pressure 0-60 psi (Aschcroft 35-1009SW-02L-60 psi)	Gage reads erratic, vibration causes internal wear	Redundant gauge, no effect	I	2	M	II	ER	10E-06
076A	H-2-690062	21	Transducer, pressure 0-150 psig, Model TJE 1/4-18 NPT Male Port (SENSOTEC Inc API21CJ-6b, 2c, 1e, 5b)	Electric failure, no output	Triple redundant, no effect with 1 failure	I	1	H	I	ER	3.5E-05
077A	H-2-690062	22	Transducer, pressure 0-50 psig, Model TJE 1/4-18 NPT Male Port (SENSOTEC Inc API21BN-6b, 2c, 1e, 5b)	Electric failure, no output	Unable to control hydrostatic head, sampling stops	I	1	H	I	ER	3.5E-05
078A	H-2-690062	25	Temperature Transmitter (Hoffer Flow Controls PT101-X-100-2-4140(180)-GUAC/0-X)	Electric failure, no output	Triple redundant, no effect with 1 failure	I	1	L	II*	ER	2.4E-06 (Temp Transducer) - *COG Input
079A	H-2-690062	36	Thermocouple Head (AL) Type K (OMEGA NB2-CASS-14G-1 5)	Electric failure, no output	Unable to monitor purge gas temperature, drilling stops	I, A	2	M	III*	ER	1E-05 *COG Input
080A	H-2-690062	82	Valve, Pressure Relief, 1 1/2" (Crosby 972103MA)	Valve fails to open when over pressure occurs	No effect in normal mode		2	L	III	---	2.5E-06
081A	H-2-690062	83	Valve, Pressure Relief, 1" (Crosby 9611ULMA)	Valve fails to open with system over pressure	No effect in normal mode		2	L	III	---	2.5E-06

TABLE 3
CORE SAMPLING TRUCK
CSS SPARE PARTS EVALUATION

3/31/95

--- None Recommended
R Recommended (on existing SP List)
ER Not Recommended (on existing SP List)

Item	Drawing Number	P/N	Description	Most Likely Failure & Cause	Failure Effects on the Core Sampling Operation	Fail Det Visual Alarm Instrm	Spare Part 1-Crit 2-Major 3-Minor	Part Fail L-Low M-Med H-High	Fail Class I II III	Recomm Spare Parts Status	Remarks
083A	H-2-690065	4	Sensor, Proximity (PEPPERL FUCHS JNB-18GH50-A)	Electrical failure, no output	Unable to position grapple, sampling stops	I	2	M	II	ER	5.9E-06
083A	H-2-690068	5	Air Conditioner 8000 BTU (Hoffman Mfg D-ACCE082)	Compressor fails to start	Unable to maintain temp requirements for instrumentation, sampling stops	I.A	2	H	II	R	
084A	H-2-690068	11	Adder Subtractor Module, 0-5VDC (MASM54/011)	Electrical failure, no output	Unable to measure downforce, drilling stops	I.A	2	H	II	ER	1.0E-05
085A	H-2-690068	13	Transformer, Isolation, 1.8KVA (Square D Topaz 91018-31)	Transformer shorts	Lose instrumentation power, sampling stops	I	2	L	III	---	3.02E-07 (Instrument Transformer)
086A	H-2-690068	14	Comparator, Dual Input Diff, 0-5V Input, 120VAC, 10A (MOORE #DCA-2X1-5V/DH11/117AC/-DA/SID)	Electrical failure no output	Loss of HBD and lower ram interlocks, sampling stops	V	2	M	II	ER	5E-06
087A	H-2-690068	15	Power Supply, +-15V, 100mA (ANALOG DEVICES #902-2)	Electrical failure no output	Loss of HBD and lower ram interlocks, sampling stops	V	2	L	III	NR	2.9E-07
088A	H-2-690068	17	Relay, 3PDT, 120VAC, 10A (POTTER BRUMFIELD #KRP14AG120)	Contacts stick closed	Loss of HBD and lower ram interlocks, sampling stops	V	3	M	III	NR	4.9E-06
089A	H-2-690068	19	Indicator, Digital Flow (HOFFER FLOW CONTROL 116-E-3-S-1-X-12-H/L-P-X-X)	Electrical failure, no output	Triple redundant, no effect with 1 failure	I	1	L	III	NR	3.45E-06 (Electronic Indicator)
090A	H-2-690068	20	Programmable Logic Controller 10-slot Chassis (TI/SIEMENS 305-04B)	Electrical failure, no output	Unable to operate instrumentation, sampling stops	I.V	2	L	III	NR	2.06E-06

TABLE 3
CORE SAMPLING TRUCK
CSS SPARE PARTS EVALUATION

3/31/95

--- None
R Recommended
ER Recommended (on existing SP List)
NR Not Recommended (on existing SP List)

Item	Drawing Number	P/N	Description	Most Likely Failure & Cause	Failure Effects on the Core Sampling Operation	Fail Det Visual Alarm Instrm	Spare Part 1-Crit 2-Major 3-Minor	Part Fail L-Low M-Med H-High	Fail Class I, II, III	Recomm Spare Parts Status	Remarks
091A	H-2-690068	21	Controller Module (TI/SIEMANS 330-37)	Electrical failure, no output	PLC failure, sampling stops	I, V	2	L	III	NR	2.06E-06
092A	H-2-690068	22	Input Module, 115VAC (TI/SIEMANS 305-20N)	Electrical failure, no output	PLC failure, sampling stops	I, V	2	L	III	NR	2.06E-06
093A	H-2-690068	23	Output Module, 115VAC (TI/SIEMANS 305-20T-1)	Electrical failure, no output	PLC failure, sampling stops	I, V	2	L	III	NR	2.06E-06
094A	H-2-690068	24	Output Module, 16 Channel (TI/SIEMANS 305-16AC)	Electrical failure, no output	PLC failure, sampling stops	I, V	2	L	III	NR	2.06E-06
095A	H-2-690068	25A	CRT & Date Logger	Electrical failure, no output	Unable to record required data during sampling	I	2	M	II	R	2E-05
096A	H-2-690068	27	24 VDC Sink Input Module (TI/SIEMANS 305-05N)	Electrical failure, no output	PLC failure, sampling stops	I, V	2	L	III	NR	1E-06, Truck 2 & 1?
097A	H-2-690068	37	Digital Panel Voltmeter (DC1204C-01.07.09.19.20.26.27.50)	Fails electrically, no output	Loss of key sampling instrumentation, sampling stops	I	2	L	III	ER*	3.0E-06 *COG Input
098A	H-2-690068	38	Digital Panel Voltmeter (DC1204C-01.07.09.19.20.26.27.38.50)	Fails electrically, no output	Loss of key sampling instrumentation, sampling stops	I	2	L	III	ER*	3.0E-06 *COG Input
099A	H-2-690068	39	Digital Panel Voltmeter (DC1204C-01.07.09.16.19.20.26.27.50)	Fails electrically, no output	Loss of key sampling instrumentation, sampling stops	I	2	L	II*	ER	3.0E-06 *COG Input

TABLE 3
CORE SAMPLING TRUCK
CSS SPARE PARTS EVALUATION

3/31/95

None
R Recommended (on existing SP List)
ER Not Recommended (on existing SP List)

Item	Drawing Number	P/N	Description	Most Likely Failure & Cause	Failure Effects on the Core Sampling Operation	Fail Det Visual Alarm Instrm	Spare Part 1-Crit 2-Major 3-Minor	Part Fail L-Low M-Med H-High	Fail Class I, II, III	Recomm Spare Parts Status	Remarks
100A	H-2-690068	40	Digital Panel Voltmeter (DCI 9000K-09-26-31-50)	Fails electrically, no output	Loss of key sampling instrumentation information, sampling stops	I	2	L	II*	ER	3.0E-06 *COG Input
101A	H-2-690068	41	Tach Readout Controller (DCI 267C-01-07-09-10-20-26-27-37-50)	Fails electrically, no output	Loss of key sampling instrumentation information, sampling stops	I	2	M	II	ER	4.07E-06
102A	H-2-690068	106	Digital Panel Voltmeter (DCI 256C-01-07-09-19-20-26-27-38-50)	Fails electrically, no output	Loss of key sampling instrumentation information, sampling stops	I	2	L	II*	ER	3.0E-06 *COG Input
103A	H-2-690068	107	Digital Panel Voltmeter (DCI 256C-01-07-08-19-20-25-27-50)	Fails electrically, no output	Loss of key sampling instrumentation information, sampling stops	I	2	L	II*	ER	3.0E-06 *COG Input
104A	H-2-690068	108	Digital Panel Voltmeter (DCI 256C-01-07-09-19-20-25-26-27-50)	Fails electrically, no output	Loss of key sampling instrumentation information, sampling stops	I	2	L	II*	ER	3.0E-06 *COG Input
105A	H-2-690068	109	Lamp, LED (Amber) (Allen Bradley 800T-N318A)	Element fails	Loss of key sampling instrumentation information, sampling stops	I	2	L	III	---	2.76E-07
106A	H-2-690068	110	Lamp, LED (Green) (Allen Bradley 800T-N318G)	Element fails	Loss of key sampling instrumentation information, sampling stops	I	3	L	III	---	2.76E-07
107A	H-2-690068	111	Lamp, LED (Red) (Allen Bradley 800T-N318R)	Element fails	Loss of key sampling instrumentation information, sampling stops	I	3	L	III	---	2.76E-07
108A	H-2-690074	4	Indicator Light, Oiltight, 120 VAC Red (Microswitch PNL B213)	Switch fails open	Operator information only, no effect	I	3	M	III	---	5.0E-06

TABLE 3
CORE SAMPLING TRICK
CSS SPARE PARTS EVALUATION

3/31/95

--- None
R Recommended (on existing SP List)
ER Recommended (on existing SP List)
NR Not Recommended (on existing SP List)

Item	Drawing Number	P/N	Description	Most Likely Failure & Cause	Failure Effects on the Core Sampling Operation	Fail Det Visual Alarm Instrm	Spare Part 1-Crit 2-Major 3-Minor	Part Fail L-Low M-Med H-High	Fail Class I, II, III	Recomm Spare Parts Status	Remarks
109A	H-2-690074	9	Relay, Enclosed 11-pin octal socket 120VAC coil, 3PDT 10A Contacts (Potter & Brumfield)	Relay sticks in one position	HBD/lower ram interlock inoperable, sampling stops	V	3	M	III	NR	4.9E-06
110A	H-2-690074	12	Relay, DPDT, 120VAC Coil, 10 amp contacts 8 pin octal base (Potter & Brumfield KRP11AG120)	Relay sticks in one position	HBD/lower ram interlock inoperable, sampling stops	V	3	M	III	NR	4.9E-06
111A	H-2-690076	10	Relay, DPDT, 120VAC Coil, 10 amp contacts 8 pin octal base (Potter & Brumfield KRP11AG120)	Relay sticks in one position	Shuts down drill engine, sampling stops	V	3	M	III	NR	4.9E-06
112A	H-2-690076	18	Lamp, LED (800-N318A)	No output - faulty connector	Indication used for maintenance only	V	3	L	III	---	2.76E-07
113A	H-2-690080	12	Flex Coupling Item 1175c (Boston Gear BF-13-3/4-1)	Shaft to flex coupling joint fails	Loss of platform rotation, sampling stops	V	2	L	III	---	6.88-07
114A	H-2-690080	13	Speed Reducer (modified) unit 4 CV-10.1 RD (WINSMITH Increase existing 13/32 mounting)	Speed reducer locks in position	Loss of platform rotation, sampling stops	V	2	L	III	NR	1.67E-06
115A	H-2-690080	14	Hydraulic Motor (SEE NOTE 10)	Leakage begins at hose connection	Loss of platform rotation, sampling stops	V	2	M	II	ER	4.3E-06
116A	H-2-690080	15	Stationary Econo-Crane II ton, 110 VAC (M110, R2ME COMB 370140-669-AM-09-88)	Crane "up" limit device fails & overloads the crane	Alternate lifting device required, slows sampling activity	V	2	H	II	R	68.42E-06 Perhaps an existing crane can be used.
117A	H-2-690080	33	Limit Switch (MICRO-SWITCH JTF2-2RN-LH)	Contacts stick in one position	Unable to properly operate grapple/RLU, sampling stops	I	2	L	III	---	1.5E-06

TABLE 3
CORE SAMPLING TRUCK
CSS SPARE PARTS EVALUATION

3-31-95

--- None
R Recommended
ER Recommended (on existing SP list)
NR Not Recommended (on existing SP list)

Item	Drawing Number	P/N	Description	Most Likely Failure & Cause	Failure Effects on the Core Sampling Operation	Fail Det Visual Alarm Instrm	Spare Part 1-Crit 2-Major 3-Minor	Part Fail L-Low M-Med H-High	Fail Class I, II, III	Recomm Spare Parts Status	Remarks
118A	H-2-690080	34	Limit Switch (MICRO-SWITCH DIF2-2RN-RH)	Contacts stick in one position	Unable to properly operate grapple/RLU. sampling stops		3	L	III	---	1.5E-06
119A	H-2-690092	4	Bi-Directional Option (Hampton Products 500100)	Electrical failure. no output	Unable to properly operate grapple/RLU. sampling stops		2	L	II*	ER	*COG Input
120A	H-2-690092	5	Motor Overload Controller (Hampton Products 400100)	Electrical failure. no output	Unable to properly operate grapple/RLU. sampling stops		2	L	II*	ER	1.5E-07 *COG Input
121A	H-2-690092	6	Controller Cycletrol "150" (R1)	Electrical failure. no output	Unable to properly operate grapple/RLU. sampling stops		2	L	II*	ER	1.5E-07 *COG Input
122A	H-2-690092	9	Lamp, Permanent Neon 115VAC, Red (DIALIGHT 249-7841-1431-574)	No function. connector fails	Operator indication only, no effect on operation	I	3	M	III	---	1.02E-05
123A	H-2-690092	25	Power Supply - 115VAC, 60HZ, Input 90VDC Output, rated 1.5A continuous (ELECTROID CORP)	Electrical failure. no output	Unable to properly operate grapple/RLU. sampling stops		2	L	III	NR	3.9E-07
124A	H-2-690092	27	Relay, 3PDT, 120VAC (POTTER & BRUMFIELD KRP14AG120)	Relay is not responsive to control signal	Unable to properly operate grapple/RLU. sampling stops		3	M	III	NR	4.9E-06
125A	H-2-690092	31	Fuse, 1A SLO-BLO (LITLIFEUSE, 313001)	Fuse opens prematurely	Unable to properly operate grapple/RLU. sampling stops		3	M	II*	R	5.0E-06 *COG Input
126A	H-2-690094	5	Bulb, T-1 3/4, 28V (CHICAGO 327)	Element fails	Unable to properly operate grapple/RLU. sampling stops		3	H	III	---	5.0E-05

TABLE 3
CORE SAMPLING TRUCK
CSS SPAPE PARTS EVALUATION

3/31/95

---	None
R	Recommended
ER	Recommended (on existing SP List)
HR	Not Recommended (on existing SP List)

Item	Drawing Number	P/N	Description	Most Likely Failure & Cause	Failure Effects on the Core Sampling Operation	Fail Det	Spare Part	Part Fail	Fail Class	Recomm Spare Parts Status	Remarks
127A	H-2-690094	8	Fuse, 3AG, 2 5A (LITTLEFUSE 31202-5)	Fuse fails to open as designed	Unable to properly operate grapple/RLU. Sampling stops	Visual Alarm Instrm	3	M	II*	R	5 0E-05 *COG Input
128A	H-2-690094	16	Counter, UP/DOWN (DCI 8033-05-27-50)	Electrical failure, no output	Unable to properly operate grapple/RLU. Sampling stops		2	M	II	ER	1E-05
129A	H-2-690094	17	Power Supply SPCV 1A (ACOPIAN 5EB100)	Electrical failure, no output	Unable to properly operate grapple/RLU. Sampling stops		2	L	III	---	2 9E-07
130A	H-2-690095	3	Meter, Panel (DAYTRONICS #3370R)	Electrical failure, no output	Unable to properly operate grapple/RLU. Sampling stops		1	L	II*	ER	3 0E-05 *COG Input
131A	H-2-690096	3	Motor Controller, DC, 120VAC Input, 0-90VDC Output, Circuit Board, Chassis Mount, 1hp	Electrical failure, no output	Unable to properly operate grapple/RLU. Sampling stops		2	L	II*	ER	1 5E-07 *COG Input
132A	H-2-690096	4	Bi-directional Option (HAMPTON PRODUCTS CO #500100)	Electrical failure, no output	Unable to properly operate grapple/RLU. Sampling stops		2	H	II*	ER	*COG Input
133A	H-2-690096	5	Time Delay Relay, Knob adjustable, 1-10 secs on operate, 120VAC Coil, 120V, 10A, DPDT Contacts (MAGNA)	Contacts stick	Unable to properly operate grapple/RLU. Sampling stops		3	M	II*	ER	4 0E-06 *COG Input
134A	H-2-690096	13	Fuse, 15A, SLO-BLO, 3AG (LITTLEFUSE 313015)	Fuse fails to blow at rated amperage	Unable to properly operate grapple/RLU. Sampling stops		3	M	II*	R	5 0E-06 *COG Input
135A	H-2-690096	17	Lamp, Permanent Neon 110-125VAC w/Built-in 100K Res 3/8 Mtg Pole (DIALIGHT 249-7841-1431-574)	No output, connector failure	Unable to properly operate grapple/RLU. Sampling stops		3	M	III	---	1 02E-05

TABLE 3
CORE SAMPLING TRUCK
CSS SPARE PARTS EVALUATION

3/31/95

--- None
R Recommended
ER Recommended (on existing SP List)
NR Not Recommended (on existing SP List)

Item	Drawing Number	P/N	Description	Most Likely Failure & Cause	Failure Effects on the Core Sampling Operation	Fail Det Visual Alarm Instrm	Spare Part I-Crit 2-Major 3-Minor	Part Fail L-Low M-Med H-High	Fail Class I, II, III	Recomm Spare Parts Status	Remarks
136A	H-2-690096	18	Pilot Light, white (DIALIGHT 245-7841-1435-574)	Element fails	Unable to properly operate grapple/RLU. sampling stops		3	H	III	---	5.0E-05
137A	H-2-690096	20	Contact, 3PD7, 11pin, 120VAC COIL, 10A Contacts (POTTER & BRUMFIELD KRP14AG120)	Electrical failure, no output	Unable to properly operate grapple/RLU. sampling stops		3	L	III	NR	2.5E-06
138A	H-2-690096	22	VARIABLE, Metal Oxide, 97VAC, 150A PEAK, 0.2W (GE VI20ZAI)	Electrical failure, no output	Unable to properly operate grapple/RLU. sampling stops		2	M	II	R	1E-05
139A	H-2-690096	24	Fuse, 1A, 3AG (LITTLEFUSE 312001)	Fuse opens - overload	Unable to properly operate grapple/RLU. sampling stops		3	M	II*	R	5.0E-06 *COG Input
140A	H-2-690100	5	Power Supply, 28VDC, 2.8 AMPS (LAMBDA LFS-40-28)	Electrical failure, no output	Unable to properly operate grapple/RLU. sampling stops		3	L	III	NR	2.9E-07
141A	H-2-690100	6	Meter, 500mA-0-500mA (MODUTECH 535-DMA-5H5)	Electrical failure, no output	Unable to properly operate grapple/RLU. sampling stops		2	L	III	NR	3.0E-06
142A	H-2-690100	7	Relay, Delay-On Operate (POTTER & BRUMFIELD #CUH-42-30C10)	Electrical failure, no output	Unable to properly operate grapple/RLU. sampling stops		2	M	II	ER	4.9E-06
143A	H-2-690100	8	Relay, General Purpose (POTTER & BRUMFIELD R10-E1-x4-V700)	Electrical failure, no output	Unable to properly operate grapple/RLU. sampling stops		3	M	III	NR	4.9E-06
144A	H-2-690100	9	Relay, Bistable Impulse (POTTER & BRUMFIELD S89R-17DAC1-24VDC)	Electrical failure, no output	Unable to properly operate grapple/RLU. sampling stops		3	L	III	NR	2.0E-06

TABLE 3
CORE SAMPLING TRUCK
CSS SPARE PARTS EVALUATION

3/31/95

--- None
R Recommended (on existing SP List)
ER Recommended (on existing SP List)
NR Not Recommended (on existing SP List)

Item	Drawing Number	P/N	Description	Most Likely Failure & Cause	Failure Effects on the Core Sampling Operation	Fail Det Visual Alarm Instrm	Spare Part 1-Crit 2-Major 3-Minor	Part Fail L-Low H-High	Fail Class I, II, III	Recomm Spare Parts Status	Remarks
145A	H-2-690100	10	Relay, Latching, Dual Coil (POTTER & BRUMFIELD KHL110150-24)	Electrical failure, no output	Unable to properly operate grapple/RLU, sampling stops		3	L	III	NR	2.7E-08
146A	H-2-690100	14	Lamp, Holder, Red Lens, 28V (DIALIGHT 162-8430-0931-502)	Element fails	Unable to properly operate grapple/RLU, sampling stops		3	H	III	---	5.0E-05
147A	H-2-690100	15	Lamp, Holder, Grn Lens, 28V (DIALIGHT 162-8430-0932-502)	Element fails	Unable to properly operate grapple/RLU, sampling stops		3	H	III	---	5.0E-05
148A	H-2-690100	16	Lamp, Holder, Yel Lens, 28V (DIALIGHT 162-8430-0933-502)	Element fails	Unable to properly operate grapple/RLU, sampling stops		3	H	III	---	5.0E-05
149A	H-2-690100	20	Fuse, 3AG, 3amp (LITTELFUSE Type 312007)	Fuse opens	Unable to properly operate grapple/RLU, sampling stops		3	M	II*	R	5.0E-06 *COG Input
150A	H-2-690100	28	Fuse, 3AG, 1/2amp	Fuse opens	Unable to properly operate grapple/RLU, sampling stops		3	M	II*	R	5.0E-06 *COG Input
151A	H-2-690100	50	Bridge, Full Wave Micro quality semiconductor VH 248	No Output	Unable to properly operate grapple/RLU, sampling stops		3	L	III	---	1.0E-06
152A	H-2-690100	51	Regulator (NATIONAL LM317)	Electric failure no output	Unable to properly operate grapple/RLU, sampling stops		2	L	III	---	3E-06 (Electric Voltage)

TABLE 4
NITROGEN TRAILER & MISC. EQUIPMENT
CSS SPARE PARTS EVALUATION

3/31/95

None
Recommended
ER
Not Recommended (on existing SP List)
NR

Item	Drawing Number	P/N	Description	Failure & Cause	Failure Effects	Fail Det Visual Alarm Instrm	Spare Part 1 Crit 2-Major 3-Minor	Part Fail L-Low M-Med H-High	Fail Class I, II, III	Recomm Spare Parts Status	Remarks
			NITROGEN TRAILER								
001A	Dwg P-940421 P O 4-404870-1A	-	Air Vent TA-11/TA-13. Armstrong	Debris at seat allows leakage	Leakage depletes liquid. Core sampling should not be interrupted	V	3	M	III	---	5.7E-06
002A	P O 4-404870-1A	1	Switch, Low/Mid Range. Diaphragm, -3 to 75 psid. Series 604D	Switch fails showing no flow	Circulation pump stops Nitrogen supply & core sampling is limited	A	2	L	III	---	3.11E-06
003A	P O 4-404870-1A	2	Control Panel, Series 80. Watlow	Terminals corrode & short	Heating capability is lost	A	2	L	III	---	
004A	P O 4-404870-1A	3	Acritem Controller, Model 3, Powers Process Control, Skokte, Ill	Controller cells for full heating - fails in this position	Nitrogen temp goes high. core sampling may be limited		2	L	III	---	3.7E-06
005A	P O 4-404870-1A	4	Centrifugal Pump w/Motor. Teel/Dayton	Pump fails to operate	Limited Nitrogen supply & limited core sampling		2	M	II	R	1.2E-05
006A	P O 4-404870-1A	5	Regulator, 4600 Series Pressure, Fisher	Regulator fails closed	Core sampling stops		2	L	III	---	2.4E-06
007A	P O 4-404870-1A	6	Swimming Pool & Spa Heater, Model R185-R405, Paypak, Inc	Heater fails	Nitrogen Supply & Core Sampling are limited		2	H	II	R	High
008A	P O 4-404870-1A	7	3-way Valve, Flow Control, TI-593 WM, Powers Process Controls	Valve fails allowing full heating	Manual override or action needed to continue core sampling		2	M	II	R	5.2E-06

TABLE 4
NITROGEN TRAILER & MISC. EQUIPMENT
CSS SPARE PARTS EVALUATION

3/31/95

--- None
R Recommended
NR Not Recommended (on existing SP List)
NR Not Recommended (on existing SP List)

Item	Drawing Number	P/H	Description	Failure & Cause	Failure Effects	Fail Det Visual Alarm Instrm	Spare Part 1-Crit 2-Major 3-Minor	Part Fail L-Low M-Med H-High	Fail Class I II III	Recomm Spare Parts Status	Remarks
009A	P O 4-404870-1A	8?	Solenoid Valve, Bronze, 2 way Type L fully Ported, Magnetrol Valve Corp	Solenoid valve fails closed	No Nitrogen supply & core sampling stops		2	M	II	R	1 1E-05
010A	P O 4-404870-1A		Regulator, R83 Cylinder gas	Regulator fails closed	Nitrogen supply is limited (no heating) Core sampling is limited		2	L	III	---	2 4E-06
011A	P O 4-404870-1A		Portable Alternator (Gillette Mfg)	Alternator fails to function	Nitrogen supply stops Core sampler stops		3	H	III	---	3 33E-5
			HOIST CABLE SPRAY WASHER ASSEMBLY								
012A	H-2-81842	6	Spray Tip (Spraying Systems Co 8001S, Brass)	Wear & corrosion diminish function	Contamination & dose rate rise Core sampling may continue		3	M	III	---	6 0E-06
013A	H-2-81842	8	Strainer, 100 Mesh Screen, COML (Spraying Systems Co 8079PP-10CM, SST)	Maintenance & corrosion result in failed screen	Tip clogs, dose rate & contamination rise Core sampling continues		3	L	III	---	1 0E-06
014A	H-2-81842	15	Gasket (Dover Co OPW, Div Buna-N, H-6471 M-3)	Gasket wears & begins leaking	Risk of contamination rises Core sampling continues		3	M	III	---	5 0E-06
			CORE SAMPLER SUPPORT TRUCK								
015A	H-2-81853	31	Immersion Heater, 7.5 KW, 240 VAC 2 NPT within wall mounting assembly (CHROMALOX PCN293034 DMH-	Filament fails	Hot water is not available In cold weather core sampling stops		3	M	III	---	4 2E-06

3/31/95

TABLE 4
NITROGEN TRAILER & MISC. EQUIPMENT
CSS SPARE PARTS EVALUATION

---	None
R	Recommended
ER	Recommended (on existing SP List)
NR	Not Recommended (on existing SP List)

Item	Drawing Number	P/N	Description	Failure & Cause	Failure Effects	Fail Det Visual Alarm Instrum	Spare Part 1-Crit 2-Major 3-Minor	Part Fail L-Low M-Med H-High	Fail Class I, II, III	Recomm Spare Parts Status	Remarks
016A	H-2-81853	34	Thermometer, 24-inch stem, Straight Form, 1/2" NPT (McMast-Carr Cat 97 3956K316)	Maintenance inadvertently fails thermometer	Core sampling continues		2	M	II	R	4 2E-05
017A	H-2-81853	36	Level Switch, Bulkhead Mount (PVDF KOBOLD MKP-6501)	Switch sticks in "Full" position	Barrel empties & no hot water, core sampling stops		2	M	II	R	5 85E-06
018A	H-2-81853	49	Pump, Plunger, Hydro Model #2340	Pump seed fails & leaks profusely	Hot water supply is diminished		2	M	II	R	8 4E-04
019A	H-2-81853	58	Flow Meter, 1/2" Male NPT (OMEGA FTB-4105)	Flow meter sticks, does not respond varied flow rate	Core sampling continues		2	M	II	R	8 36E-06
020A	H-2-81853	70	Motor, Electric (Dayton #4K090)	Bearings fail	Hot water supply stops (Core sampling is stopped)		2	M	II	R	4 0E-06
021A	H-2-81853	103	Valve, Relief (HYDRO #8000-0007)	Valve fails to open due to corrosion	Fitting downstream fails, no hot water available for core sampling		2	L	III	---	2 5E-06
022A	H-2-91671	10	Bushing, HEX 3/8 NPT to 1/4 NPT Series 2490 (VOGT CO)	Bushing fails from repeated maintenance & corrosion	Failure during maintenance, core sampling cannot restart		3	L	III	---	1 48E-6
023A	H-2-91671	11	Body Male Inlet, P.N. 1/4 IT Brass (Spraying Systems)	Fails from repeated maintenance & corrosion	Failure during maintenance, core sampling cannot restart		3	L	III	---	1 48E-6

TABLE 4
NITROGEN TRAILER & MISC. EQUIPMENT
CSS SPARE PARTS EVALUATION

3-31-95

---	None
R	Recommended
ER	Recommended (on existing SP List)
NR	Not Recommended (on existing SP List)

Item	Drawing Number	P/N	Description	Failure & Cause	Failure Effects	Fail Det	Spare Part	Part Fail	Fail Class	Recomm Spare Parts Status	Remarks
024A	H-2-91671	12	Spray Tip, PN 50015 Brass (Spraying Systems)	Wear & corrosion diminishes function	Failure during maintenance. Core sampling cannot restart	Visual Alarm Instrm	3	L	III	---	1 48E-6
025A	H-2-91671	13	Tip Retainer, PNI325 Brass (Spraying Systems)	Retainer is lost	Failure during maintenance. Core sampling cannot restart		3	L	III	---	1 48E-6
026A	H-2-91671	14	Strainer, PN8079 NY-100M, SST SCREEN 100 MESH (Spraying Systems)	Screen fails from maintenance & corrosion	Failure during maintenance. Core sampling cannot restart		3	L	III	---	1 48E-6
32			DUST CAP ASSEMBLY								
027A	H-2-91678	8	Filter, Assault, Cartridge (Scott AVNSAF Supply, 642-0V-H)	Filter clogs	Pressure could fail filter & spread contamination. Core sampling continues		2	L	III	---	1 2E-06
			NITROGEN HEATER								Note: All Nitrogen Heater parts are available from INDEECO
028A			Immersion Heater #729XJ2073 INDEECO	Filament fails	In cold weather, core sampling may stop		2	M	II	ER	4 2E-06
029A			Gasket, Flange Heater, 2" x 150" x 1/16 thk. Flingersil C-4401	Gasket fails upon heater replacement	In cold weather, core sampling may stop		2	M	II	ER	4 2E-06

ATTACHMENT 1

LIST OF SPARE PARTS REQUIRED FOR ATP/OTP

DRAWING NUMBER	P/N	QTY	DESCRIPTION
H-2-690014	11	1	GAUGE, PRESSURE 0-600 PSI, 6 INCH DIAL, REAR FLG MT, LIQUID FILLED NOSHOK 60.500-600
	12	3	TRANSDUCER, PRESSURE MODEL TJE, 0-300 PSIG, 1/4 NPT, 0-5 V OUTPUT. SENSOTEC AP121CP-6B-2C-1E-5B
	20	1	VALVE FLOW CONTROL, 3/4 NPT FEMALE 25 GPM, PARKER HANNIFIN CO. F1200
	21	1	PRESSURE REDUCING VALVE, 3/4 100-3000 PSI, PARKER HANNIFIN CO. PRC101S10-8T
	64	1	TRANSDUCER, PRESSURE MODEL TJE 0-300 PSIG, 1/4 NPT, $\pm$ 5 VDC OUTPUT. SENSOTEC AP121CP-2B-6B-5B-1E
H-2-690015	100	1	PROPORTIONAL DIRECTIONAL CONTROL VALVE. PARKER HANNIFIN CO. D31FTE01CC4NF00
H-2-690020	23	1	MOTOR DC PN3268 W/MOTOR FOOT. DANFOSS ELECTRONICS
	67	1	BRAKE, MFSB-42-16, COIL #1 STYLE T ELECTROID CORP.
H-2-690021	13	1	LINE CONDITIONER, HARD WIRED, 1KVA 120/240V 60 HZ, NOISE REDUCTION 120DB GENERAL DYNAMICS 9T91L1173
H-2-690030	31	1	LOAD CELL 0-500 LB, DILLON/QUAL PLUS MODEL Z 33565-0164 WITH CONNECTOR
	32	1	ENCODER BEI H25D-SS-100-ABC-8830-LED-EM16-S. 924-01002-5700
	35	1	SLIP RING MERIDIAN LABORATORY ROTOCON MODEL NO. MX02 (SEE NOTE 13)
H-2-690035	9	1	PRESSURE REGULATOR WITH GUAGE, 0-125 PSIG PRESSURE RATING 250 PSIG, 0-160 PSIG GAUGE WILKERSON R26-04-000 REGULATOR GRP-95-229 GAUGE
H-2-690038	1	1	REMOTE LATCH UNIT ASSEMBLY
	4	2	MOTOR ASSEMBLY
H-2-690040	31	1	LIMIT SWITCH, MICRO-SWITCH DTF2-2RN-LH
	32	1	LIMIT SWITCH, MICRO-SWITCH DTF2-2RN2-RH
H-2-690052	1	2	GRAPPLE HOIST ROTARY VALVE ACTUATOR

H-2-690053	8	1	MAGNETO, TACHOMETER GENERATOR WITH 1:20 STEP-UP GEARBOX AND 16 TOOTH 16P DRIVE PINION. INSTRUMENTATION AND CONTROL ENGINEERING M1200-HAST
H-2-690054	5	1	LOGIC MAGNETIC PICKUP, EMITTER FOLLOWER, 3-PIN CONNECTOR. RED LION CONTROLS PN LMPEC000
H-2-690055	19	1	MOTOR, 3/4 HP, 1725 RPM, 90VDC, NEMA 56C FRAME, SHUNT WOUND. GENERAL ELECTRIC 5BCD56RD397
	20	1	HOLDING BRAKE, SPRING SET (56C FRAME). 115 VAC DYNACORP EMERSON POWER TRANSMISSION CORP. SSBP-56-6
	26	1	TRANSDUCER, CABLE EXTENSION AND VELOCITY. CELESCO TRANSDUCER PRODUCTS INC. PT8510-0030-111-1110
H-2-690057	13	2	WIRE ROPE ASSY. SEE NOTE 8
	40	1	LOAD CELL MINIATURE. SENSOTEC AL311CR-1E
H-2-690062	9	1	VALVE, PRESSURE REGULATOR 3/4. 2 INCH FACE WITH GUAGE PARKER P781642PA
	10	1	VALVE, PRESSURE REGULATOR (1/4 PNPT) MCMASTER-CARR 4956K1
	11	1	VALVE, SOLENOID 2 POS, 3 WAY, NC, MAN. OVERRIDE, 3/4. PARKER N315-65-04853P
	12	1	VALVE, SOLENOID 2 POS, 3 WAY, NC, MAN. OVERRIDE, 3/8. PARKER CW013701
	14	1	VALVE NEEDLE FLOW CONTROL, 1 IN. PARKER HANNIFIN CO. MV1600S
	15	1	VALVE FLOW CONTROL 1/2 IN. WHITEY SS-1RS8
	16	3	FLOWMETER, TURBINE, 1 1/4 SEE NOTE 7
	17	2	FLOWMETER, IN-LINE GAS MASS. 1/2. SIERRA INSTRUMENTS 760-N2 (1/2)
	19	1	GAGE, PRESSURE 0-160 PSI. ASHCROFT 35-1009SW-02L-160PSI
	20	1	GAGE, PRESSURE 0-60 PSI. ASHCROFT 35-1009SW-02L-60PSI
	21	6	TRANSDUCER, PRESSURE 0-15PSIG, MODEL (TJE) 1/4 18NPT MALE PORT. SENSOTEC INC. AP121CJ-6b,2c,1c,5b
	22	6	TRANSDUCER, PRESSURE 0-50PSIG, MODEL (TJE) 1/4 18NPT MALE PORT. SENSOTEC INC. AP121BN-6b,2c,1c,5b

	25	3	TEMPERATURE TRANSMITTER SEE NOTE 8
	36	1	THERMOCOUPLE HEAD (AL) TYPE K. OMEGA NB2-CASS-116G-1.5
H-2-690065	4	1	SENSOR, PROXIMITY. TURCK B1 8-M18-AN6X-H1141
H-2-690068	11	1	ADDER SUBTRACTOR MODULE, 0-5VDC. ADTECH ASM54
	14	1	COMPARATOR, DUAL INPUT DIFF, 0-5V INPUT, 120VAC, IDA. MOORE #DCA-2X1-5V/DH1L1/117AC/-DA/-10A(AB)
	15	1	POWER SUPPLY, $\pm 15V$, 100mA. ANALOG DEVICES #902-2 OR 900
	16	1	SOCKET, POWER SUPPLY. ANALOG DEVICES #AC 1013
	17	1	RELAY, 3PDT, 120VAC, 10A. POTTER & BRUMFIELD #KRPA14AG120
	19	3	INDICATOR, DIGITAL FLOW. HOFFER FLOW CONTROL 116-E-3-S-1-X-12-H/L-P-X-X (SEE NOTE 15)
	20	1	PROGRAMMABLE LOGIC CONTROLLER 10-SLOT CHASSIS. TI.SIEMANS 305-04B
	21	1	CONTROLLER MODULE. TI/SIEMANS 330-37
	22	1	INPUT MODULE, 115VAC. TI/SIEMANS 305-20N
	23	1	OUTPUT MODULE, 115VAC. TI/SIEMANS 305-20T-1
	24	1	OUTPUT MODULE, 16 CHANNEL. PLC DIRECT/DIRECT LOGIC F3-16TA-1
	27	1	24 VDC SINKK INPUT MODULE. TI/SIEMANS 305-05N
	37	1	DIGITAL PANEL VOLTMETER. DCI 204C-01,07,09,19,20,26,27,50
	38	2	DIGITAL PANEL VOLTMETER. DCI 204C-01,07,09,19,20,26,27,38,50
	39	2	DIGITAL PANEL VOLTMETER. DCI 204C-01,07,09,16,19,20,26,27,50
	40	2	DIGITAL PANEL VOLTMETER. DCI 9000K-09,26,31,50
	41	2	TACH READOUT CONTROLLER. DCI 267C-01,07,09,10,20,26,27,37,50
	106	2	DIGITAL PANEL VOLTMETER. DCI 256C-01-07-09-19-20-26-27-38-50
	107	2	DIGITAL PANEL VOLTMETER. DCI 256C-01-07-08-19-20-25-(SCFM)-26-27-50
	108	2	DIGITAL PANEL VOLTMETER. DCI 256C-01-07-09-19-20-25-(LBS)-26-27-50

H-2-690074	9	1	RELAY, ENCLOSED 11-PIN OCTAL SOCKET 120VAC COIL, 3PDT 10A CONTACTS. POTTER & BRUMFIELD KRPA14AG120
	12	11	RELAY, DPDT, 120VAC COIL, 10 AMP CONTACTS 8 PIN OCTAL BASE. POTTER & BRUMFIELD KRPA11AG120
H-2-690076	10	1	RELAY, DPDT, 120VAC COIL, 10 AMP CONTACTS 8 PIN OCTAL BASE. POTTER & BRUMFIELD KRPA11AG120
H-2-690080	13	1	SPFED REDUCER UNIT 5 CV-10:1 RD. WINSMITH
	14	1	HYDRAULIC MOTOR. PARKER 110A-129-AP-0
H-2-690092	4	2	BI-DIRECTIONAL OPTION. DAN FOSS INC. 500100 SEE NOTE 8
	5	2	MOTOR OVERLOAD CONTROLLER. DAN FOSS INC. 400100 SEE NOTE 8
	6	2	CONTROLLER CYCLETROL "150" (RI). SEE NOTE 4,8
	25	1	POWER SUPPLY - 115VAC; 60HZ INPUT 90 VDC OUTPUT, RATED 1.5A CONTINUOUS, SEE NOTE 8. ELECTROID CORP C-500-3
	27	1	RELAY, 3PDT, 120VAC. POTTER & BRUMFIELD KRPA14AG120
H-2-690094	16	1	COUNTER, UP/DOWN. DCI 8033-05-27-50
H-2-690095	3	1	METER, PANEL. DAYTRONICS #3370R
H-2-690096	3	2	MOTOR CONTROLLER, DC, 120VAC INPUT, 0-90VDC OUTPUT, CIRCUIT BOARD CHASSIS MOUNT, 1 HP. DANFOSS NC VAR SPEED A2000 #A3101A000 SEE NOTE 3 AND 7
	4	2	BI-DIRECTIONAL OPTION. DAN FOSS INC. #500100 SEE NOTE 3
	5	1	TIME DELAY RELAY, KNOB ADJUSTABLE 1 TO 10 SECONDS ON OPERATE 120VAC COIL, 120V, 10A, DPDT CONTACTS. MAGNA CRAFT W211ACPSOX-5 SEE NOTE 3
	20	1	CONTACTOR, 3PDT, 11 PIN, 120VAC COIL, 10A CONTACTS. POTTER & BRUMFIELD KRPA14AG120
H-2-690100	5	1	POWER SUPPLY, 28VDC, 2.8 AMPS. LAMBDA LFS-40-28
	6	1	METER, 500mA-0-500mA. MODUTEC 5 35-DMA-5H5
	7	1	RELAY, DELAY-ON OPERATE. POTTER & BRUMFIELD #CUH-42 30010
	8	1	RELAY, GENERAL PURPOSE. POTTER & BRUMFIELD R10-E1-X4-V700

	9	1	RELAY, BISTABLE IMPULSE. POTTER & BRUMFIELD S89R-11DBD1-24
	10	1	RELAY, LATCHING, DUAL COIL. POTTER & BRUMFIELD KUL11D15D-24

ATTACHMENT 2
EXHAUSTER SPARE PARTS LIST

Item # Description

- 1 Interface card, Allen Bradley #1335-MOD-L3
- 2 Power supply card, Allen Bradley #SP-151133
- 3 Main control board, Allen Bradley #SP-120659
- 4 Universal controller, Yokogawa Model UT 37 1/4 DIN. With T/C, MV, V, RTD inputs. 4-20 MADC output (PID), time proporti
- 5 Rosemount Analytical Model 400A total hydrocarbon analyzer. Analyzer matrix: 5001-0010-1000
- 6 Bruel and Kjaer Type 1302 multi gas monitor
- 7 Eberline Alpha 6A-1 Alpha monitor
- 8 Eberline AMS-4 Beta Monitor
- 9 Air Dimensions Inc Model MM01310V sample pump.
- 10 Switch/Gage, Magnehelic (MODEL #2005)
- 11 Switch/Gage, Photohelic (MODEL #3010)
- 12 Stack Massflow Transmitter (Includes: TT-1,DC-1,FY-1, and FI-1) (FT-1, MASS-tron (I.D. Code))
- 13 Sample Massflow Transmitter (Includes: TT-2, -3,-4; DC-2,-3,-4; PT-2,-3,-4; FY-2,-3,-4; FI-2,-3,-4)(FT-2,-3,-4 MASS-tron
14. Manifold Vacuum Pressure Control Valve with Actuator 3/4" 3-way (PCV-5 Delta (Belimo) 75-3-12SS/SM24SR)
- 15 Sample Flow Control Valves with Actuator (1/2" 2-Way) (FCV-2-3-4 Delta (Belimo) 05-2-10SS/SM24SR)
- 16 Manifold Vacuum Pressure Transmitter (Includes: PI-5) (PT-5 VEL-trol 5000AZ)
- 17 Vacuum, Pump Intake Isolation Control Valve with Actuator (3/4" 3-Way) (ICV-6 Delta (Belimo) 75-312SS/SM24)
- 18 Vacuum Pump Exhaust Isolation Control Valve with Actuator (1" 3-Way) (ICV-7 Delta (Belimo)1-3-14SS/SM24)
- 19 Vacuum Relief Valve 5-27" Hg (VRV-1,2 Gast, AA 840A)

EXHAUSTER SPARE PARTS LIST (CONT'D)

- 20 Exhaust Fan On/Off Status Relay (2PDT) (K-1 IDEC, RY2S-U-AC24V)
- 21 Pump Start Relays (2PDT) (K-2, K-3 IDEC, RN2B-U-AC24V)
- 22 Vacuum Pump Intake Filter/Muffler (Attaches at PCV-5 Allied Witan, FS Type 4-44 Model F-10)
- 23 Ribbon Cartridge (Chessel Recorder) (Used with DL-1 Chessel, LA243101)
- 24 Chart paper, Z-fold (Chessel Recorder) (Used DL-1 Chessel, GD2441D1U10)
- 25 2 Amp Pico Fuse (Used with FT-1, -2, -3, -4 AMC, 205-036-00)
- 26 1 Amp Pico Fuse (Used with FT-1, -2, -3, -4 AMC, 205-843-00)
- 27 1/8" Amp Pico Fuse (Used with FT-1, -2, -3, -4 AMC, 205-374-00)
- 28 1.5 Amp Pico Fuse (Used with PT-5, AMC, 205-035-00)
- 29 1.6 Amp Fuse, 3AG (Used with FT-1, -2, -3, -4, PT-5, AMC, 205-056-00)

ATTACHMENT 3
DRAWING P-940421

AIM

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