YUKON ELECTRICAL COMPANY LIMITED
(YECL)

REFERENCE: **Overall**

PREAMBLE:

Yukon Electrical would like details regarding all Whitehorse Rapids Hydro and Aishihik Hydro Generation facility outages impacting the WAF grid system from 2003 to 2008 inclusive.

QUESTION:

a) Please provide copies of all service interruption reports regarding generation outages at the Whitehorse Rapids and Aishihik Generating facility.

b) Please provide an excel spread sheet or equivalent summarizing the cause for each outage at each facility.

c) Please provide what actions or steps were taken to remedy or correct the cause for each of the outages listed.

d) Please list all O&M and capital expenditures that have been undertaken at the Whitehorse Rapids and Aishihik Hydro Generating facilities that specifically have improved reliability to customers. Please explain how each expenditure has contributed to service reliability.

ANSWER:

(a)

Please see Attachment 1 to this response.

(b) and **(c)**

Please see Table provided below**.**

Outages as Whitehorse and Aishihik

Unit	Failed Component	# of Occurances	Action to Prevent
WH4	Failed coil	1	Replaced coil
	Unknown	1	N/A
	Bus Bar Failure	2	Replaced bus bar
	Governor	7	Replaced hydraulic manifold
WH3	Governor	2	Plan to replace PLC
AH1	Cable failure	1	Replace cables
	Unknown	1	N/A
	High stator temp	1	Reset alarm levels
Transmission	Animal contact	1	None
S150	Incorrect wiring	1	Review with tradesman
	Unknown	1	N/A
L172	Unknown	1	N/A
	Vandalism - Broken Insulators	1	Review in media and with RCMP
L170	Lightning	1	None
S171	Incorrect relay reset	1	Review with tradesman
S167	Failed pot head	1	Replace pot head

(d)

Please see the table provided below.

Expenditures at Whitehorse and Aishihik ($000s)

YUKON ENERGY CORPORATION
EXPENDITURES at Whitehorse & Aishihiks
($000S)

	Actual			Forecast		
Description	**2005**	**2006**	**2007**	**2008**	**2009**	**comments**
P126 WD3 Re-build				1,100		Replace and refurbish parts for diesel
WH1 Trunion Bushing	370					Replace trunion bushing before failure
AH2 Rewind Stator		721				Increased output from the generator
AH2 Rewind Mechanical		305				will also improve life of the insulation
AH2 Rewind Rotor		268				and reliability of the unit.
Aishihik Cable Replacement		241				Replace failed cables
AH2 Protection Upgrade		88				Upgrade quality of protection equipment
WH4 Life Extension Project			550			
P126 Mirrlees Cooling System Upgrade			469			Upgrade cooling system
Underground Fuel Piping Remediation/Replacement			142			Improve fuel delivery system to diesels
WH3 & P125 Governor Upgrade			127			Improve governor control
AH1 Protection Upgrade			59			Upgrade quality of protection equipment
P126 Mirrlees Electrical Upgrades				150		Upgrade parts & equipment
P126 Mirrlees Cooling System Replacement				150		Upgrade parts & equipment
P126 Mirrlees Auxiliary Systems Replacement				150		Upgrade parts & equipment
AH0 Current Transformer Replacements				67		Replace current transformer before end of life
WH0 Improve Spill Regulation				25	200	Improve spill regulation so spill gates are more reliable since they won't operate as much
AH0 Deluge System					69	Fire extinguisher system
WD4 Control Upgrade					60	upgrade control equipment
Whitehorse Rapids Instrument Upgrade	99					Upgrade instruments
Electric Boiler Replacement P126	66					Improve heating in P126
Power Line Carrier Takhini - AH Replacement				155		Improve communications with Aishihik
TOTAL	**535**	**1,624**	**1,347**	**1,797**	**329**	

Yukon Energy Corporation

System Disturbance Report

Date: Aug 18 2005

System Operator: Steve Blysak

Weather: Cloudy light rain 12degs

Percentage of Grid: 34%

Pre-Disturbance Generation Setup

AH1	4.2mw
WH4	16 mw
WH1	5.27mw
WH2	5.42mw

Total Generation Online 30.89 Mw

Disturbance:

09:36:54	Wh4 Tripped	-16mw
09:36: 54	S6838 u/f trip	2.8mw
09:36:55	S150 52-17 u/f trip	2.70mw
09:37:14	S150 52-22 trip by op	2.73mw
09:37:34	S150 52-18 trip by Op	2.42mw
	Total Load Lost	**10.65**

Restoration

09:43	Started AH2 but unit failed to Sync cause still under investigation
09:47	WH3 ON
09:56	S150 52-22 Closed 4.3mw
09:58	S150 52-17 Closed 1.74mw
10:03	WD7 ON
10:04	S6817 Closed
10:05	FD7 ON
10:05	S150 52-18 Closed 2.74mw
10:06	WD6 ON
10:06	FD5 ON
10:08	S6838 Closed 2.06mw
10:09	S9403 Closed 1.44mw
10:10	S9402 Closed 1.08mw
10:11	Faro Mine load (pumps) .5mw

Time Variance

Feeder	Opened / Tripped	Closed	Variance
S6838	09:36:54	10:08	31min 6secs
S150 52-17	09:36:55	09:58	21min 5secs
S150 52-22	09:37:14	09:56	18mim 46secs
S150 52-18	09:37:34	10:05	27min 26secs
S9403	09:36:55	10:09	32min 5secs
S9402	09:36:55	10:10	33min 5secs
Mine load (pumps)	09:36:55	10:11	34min 5secs

Target /Flags.

P127 #2 phase u/v, 5G, 5G1, 121XA

Comments:

The cause of the outage originated in P127 with a failed bus bar on #4 tripping the unit at 16mw causing system u/v and u/f.

Yukon Energy Corporation

System Disturbance Report

Date: August 20 2005

System Operator: Steve Blysak

Weather: Cloudy and Smokey 13deg C

Percentage of Grid: 100%

Pre-Disturbance Generation Setup

WH4	16mw
WH3	8mw
WH1	3.2mw
WH2	3.2mw

Total Generation Online 30.4 Mw

Disturbance:

11:15:48	WH4 Tripped	-16mw
11:15:50	S6838 Tripped u/f	3.1mw
11:15:51	S150 52-17 Tripped u/f	2.8mw
11:16:00	S150 52-22 tripped u/v	1.65mw
11:16:03	S150 52-21 Tripped u/v	5.95mw
11:16:50	S6837 Opened by Op	3.00mw
11:17:08	WH1 tripped	
11:17:11	WH2 tripped	
11:17:17	S150 52-18 Opened by Op	4.01mw
11:18:03	S164 52-3 Opened by Op	4.1mw
11:18:03	Faro 701 Open u/v	
11:18:06	WH3 tripped	
11:18:06	Black Out	

Restoration

11:20:23	S164 52-1 Open by Op	
11:21:00	AH1 Closed dead bus	L171 Energized
11:23:06	Faro 503 Opened	
11:23:18	Faro 506 Opened	
11:23:57	Faro 507 Opened	
11:24:00	S170 52-1 Open by Op	
11:24:22	S164 52-1 Closed	Energizing L172, L169, S150 and SCC
11:27:56	P132 52-FD7 Closed	Energizing FD0 SS and L356 (505)
11:29:19	Faro 506 Closed	Energizing Faro feeder #2

11:30:01	Faro 507 Closed	Energizing Faro Tfeeder #1
ALL Faro and Ross River Customers Restored with FD7		
11:33:47	S170 52-1 Closed	Energizing Mac Sub
11:35.01	S150 52-18	Energizing Arkell Sub 5.82mw *
11:36:52	AH2 ON	Synced Locally by Ron Kirkwood
11:38:42	S150 52-22	Energize 9L up to McRae Sub 2.21mw
11:39:26	S6838 Closed	2.45mw
11:42:30	S6837 Closed	4.59mw
11:46:42	S164 52-3	Energizing L170 up to Faro and the Mine
11:47:23	WH3 ON	
11:47:58	WH2 ON	
11:50:36	S150 52-17 Closed	1.69mw
12:08:03	701 Closed	
12:10:10	503 Synced Closed	
12:10:59	S150 52-21 Closed	
12:12:50	FD7 OFF	By Lloyd M.

Time Variance

Feeder	Opened / Tripped	Closed	Variance
Faro 505	11:18:03	11:27:56	9min 53secs
Faro 506	11:18:03	11:29:19	11min 16secs
Faro 507	11:18:03	11:30:01	11min 58secs
S150 52-18	11:17:17	11:35.01	17min 44secs
S150 52-22	11:16:00	11:38:42	22min 42secs
S6838	11:15:50	11:39:26	23min 26secs
S6837	11:16:50	11:42:30	25min 20secs
S164 52-3	11:18:03	11:46:42	28min 39secs
S150 52-17	11:15:51	11:50:46	34min 55secs
Faro 503	11:18:03	12:10:10	
S150 52-21	11:16:03	12:10:59	54min 56secs

Target /Flags.

Comments: WH4 tripped at 16mw Causing the system to Shed its u/f breakers then the system went unstable until WH0 units all tripped and there was no generation left on (Blackout)

Yukon Energy Corporation

System Disturbance Report

Date: September 2, 2005

System Operator: Mike Hannah

Weather: 12 degrees and cloudy

Percentage of Grid: 10%

Pre-Disturbance Generation Setup

WH1	3.4 MW
WH2	2.8 MW
WH3	8.0 MW
WH4	13.1 MW
AH1	3.0 MW

Total Generation 30.3 Mw

Disturbance:

15:55:22	WH4 trip
15:55:22	S6838 trip

Restoration

15:58:27	AH2 On line
16:18:32	S6838 Closed

Time Variance

Feeder	Opened / Tripped	Closed	Variance
S6838	15:55:22	16:18:32	23 minutes 10 seconds

Target /Flags. WH4 > 51W1 Phase time over current
94T/L127
97S
52AX
86EG
27 Phase Under Voltage

WH4 Exciter > 27 FDG

Comments: The cause for WH4 tripping off line was due to a burnt busbar. SCC Operator had to wait for YECL to split the load on S6838 at Porter Creek Sub Before closing in S6838.

Yukon Energy Corporation
System Disturbance Report

Date: Jan 29, 2006

System Operator: Myles O'Brien

Weather: -25 Calm

Percentage of Grid: 100%

Pre-Disturbance Generation Setup

WH 3	7.0
WH 4	18.2
AH 1	11.9
AH2	11.9

Total Generation: 50.20 Mw

Disturbance:

Time	Event
13:32:43	AH1 ground over-current alarm (multiply times)
13:34:03	P130 52-F2 tripped (23.8 Mw loss of generation 48%of system)
13:34:03	S167 52-1 tripped
13:34:03	AH2 tripped – Over-speed
13:34:04	S6838 tripped - U/F
13:34:05	S150 52-17 tripped - U/F
13:34:14	S150 52-21 tripped - U/V
13:34:14	S150 52-22 tripped - U/V
13:34:14	S6837 tripped - U/V
13:34:15	Faro 701 tripped - U/V
13:34:16	WH4 tripped - Non-Lockout Over-speed
13:34:20	S150 52-18 tripped
13:38:15	Faro 503 opened
13:40:05	S164 52-R1 tripped (R1 reactor fault alarm)

Restoration

13:42:42	FD7 on
13:44:18	Faro 507 closed picking up Faro
13:44:31	Faro 505 closed picking up Ross River and 506 load
13:51:25	S150 52-1 opened (Split S150 from grid)
13:51:38	S150 52-15 opened (Split S150 from grid)

13:53:25	WH2 on line
13:55:56	S171 52-1 open
13:56:01	S171 52-3 open
13:56:31	S164 52-3 opened
13:58:45	WH2 tripped – 86 mechanical fault – low oil pressure shutdown
14:03:15	S167 52-1 closed
14:03:22	S150 52-17 closed (2.67 Mw pickup)
14:03:30	WH3 tripped - 86 electrical lockout
14:03:33	S150 52-17 tripped - U/F
14:04:58	P130 52-F2 closed (AH1 energized to S150)
14:05:27	S150 52-15 closed (AH1 energizes S150 & YEC SS)
14:05:37	S150 52-1 closed
14:06:42	P130 52-F2 tripped (closed 1 min 42 sec)
14:06:42	S167 52-1 tripped
14:06:42	AH1 tripped - lock out
14:07:19	S150 52-1 open
14:07:34	S150 52-15 open
14:29:42	S171 89-13 open – GOI point for WAP 06-27 P127 T9 inspection
14:32:21	WD7 placed on line
14:49:56	WH3 over-speed on start-up
Note	Could not sync hydro to WD7 Re: WD7 low voltage 3.3 kV, PLC problem.
15:37:50	WD7 off line – required to sync hydro on
15:39:14	WH3 on line
15:41:27	S150 52-17 closed (No load pickup, 19L sectionalized)
15:42:33	S150 52-17 tripped - U/F (estimated 2.5 Mw pickup)
15:46:30	WH2 on line
15:46:58	S150 52-17 closed (No load pickup, 19L sectionalized)
15:48:15	19L load pickup 2.56 Mw
15:49:41	S150 52-17 tripped via SCADA Re: System unstable WH2 and WH3 swinging
15:53:08	S150 52-17 closed (No load pickup, 19L sectionalized)
15:53:08	WH2 tripped – 86 Electrical fault
15:53:57	WH4 on - energized to S171 89-13
15:55:55	S150 52-17 U/F disabled
15:58:41	WH2 on line
15:59:51	S150 52-21 closed
16:00:50	WH4 off line - required to close S171 89-13
16:10:30	WH2 tripped - 86NC Low oil pressure shut-down
16:14:19	S171 89-13 closed
16:15:13	S171 52-1 closed
16:16:03	S171 52-3 closed
16:19:36	WH4 on
16:25:59	S150 52-15 closed
16:26:39	S150 52-1 closed

16:32:04	WD7 on line
16:43:38	WD1 on line
16:44:47	S6837 closed
16:45:52	S6838 closed
16:45:52	S6838 tripped - U/V
16:45:52	S6837 tripped -- U/V
16:48:31	S6837 closed
16:50:02	S6838 closed
17:00:01	WH2 on line
17:05:55	WD6 on line
17:07:26	WD4 on line
17:11:46	S150 52-18 closed
17:13:03	S150 52-22 closed
17:35:26	WD1 off line
17:35:26	WD7 off line
17:49:05	WD6 off line
17:54:03	AH1 on line - P130 bus and L355 energized
17:55:24	S167 52-1 closed
17:57:00	AH1 off line (L355 de-energized)
18:09:24	WD3 on line
18:22:12	AH1 on line
18:24:17	P130 52-F2 tripped
18:24:17	S167 52-1 tripped
18:24:17	AH1 tripped -- ground over current
18:28:11	WD1 on line
18:31:56	WD2 on line
20:00:21	S167 52-R1 failed to open (locally or remotely)
20:18:44	S167 89-R1 open
20:21:58	S167 89-LT3 open - S167 bus isolation
20:25:30	S167 89-1L open - S167 bus isolation
20:30:00	S167 89-1B confirmed open - S167 bus isolation
20:31:58	P130 52-F1 opened (false indication?)
20:38:04	AH2 on line (L355 energized)
20:52:41	AH2 off line (L355 de-energized)
21:05:10	S164 52-3 closed
21:36:26	AH2 on line (L355 energized)
22:19:09	S164 52-3 opened
22:21:56	S164 52-R1 closed
22:26:18	S164 52-3 closed
22:33:31	Faro 701 closed
22:33:55	Faro 503 closed
22:37:00	FD7 off line
22:47:03	P130 52-F1 closed (false indication?)

22:53:07	WD3 off line
23:30:17	WD6 on line
23:44:32	WD1 off line
23:48:49	WD6 off line

Time Variance

Feeder	Opened / Tripped	Closed	Variance
S6838	13:34	16:50	3:16
S6837	13:34	16:48	3:14
S150 52-17	13:34	15:53	2:19
S150 52-21	13:34	15:59	2:25
S150 52-22	13:34	17:13	3:39
S150 52-18	13:34	17:11	3:37
Faro 505	13:34	13:44	0:10
Faro 507	13:34	13:44	0:10
S164 52-3 (L170)	13:51:25, 22:19:09	21:05:10, 22:26:18	7:20:54
L171	13:51:25, 14:05:27	14:06:42, 16:19:36	2:26:56
L355	14:06:42, 17:57:00, 18:24:17, 20:52:41	17:54:03, 18:22:12, 20:38:04, 21:36:26	7:10
Mendenhall	13:34	Jan 30/06 4:43	15:09 estimated

Target /Flags:

S6838	under frequency
S6837	under-voltage
S150 52-17	under – frequency
S150 52-18	under-voltage
S150 52-21	under-voltage
S150 52-22	under-voltage
WH4	over-speed
AH1	ground over current (did not trip)
AH2	over-speed
S167 Bus	bus differential

Comments:

The cause of this disturbance was found to be a faulted cable running from the switchgear to the transformer. There are 3 cables per phase totaling 9 cables, one of the A phase faulted.

The following issues were identified form the internal outage de-brief

1. **Overall Command**
   - In some situations it was felt that it would be beneficial to take the time to determine what the original issues were, have a meeting of key personnel to allow everyone to understand the problem and then assign tasks.

2. **Communications**
   - Phones failed in the diesel plant making communication with SCC impossible.
   - Radio etiquette – what should be said and how to say it on the radios should be discussed.

- The help line rang constantly until it was taken off the hook – perhaps in major outages it should be assigned to a non-operations person or at least the message should be changed to indicate the current conditions.
- Hand held radios should be available – Al plans to buy a few, there are two currently in SCC, and two in Brian's office that should be moved to SCC. They will then be available in one place and can be maintained by the SCC Operators.
- Tracking employees who are on site to assist (who comes in and who leaves) should be done.
- Phone number 5355 will become a recorded line.

3. **Stable Station Service**
   - The lack of station service created additional problems.
   - No AC power to louvers in spillway diesel, unit overheated.

4. **Response of Hydro Units**
   - Droop settings – would it be worthwhile to change the droop settings, would it give more control to the SCC operator.
   - Hydraulic governors – big time lapse with hydraulic governors.

5. **Response of Diesel Units**
   - Isoc load sharing on diesels needed
   - WD1 breaker issues
   - PLC WD7 issues
   - WD6 rad fans
   - WD4 low fuel alarms
   - No plant alarms
   - WD7 fuel valve

6. **Gates**
   - No communication at the gates
   - Needed local power to lift gates while station service was down – should there be a power supply set up permanently at the gates
   - Wasted time getting tools – should be left in the building
   - Couldn't see the elevation changes on the gates – poor lighting
   - Should a line be painted on the gate showing the optimum elevation if all the units are down
   - On an ongoing basis, should the OIC call SCC every morning to check on the gate level in case of emergency
   - Dedicated person assigned to gates in an emergency if there is enough resources

7. **Training**
   - It was suggested that on going training of emergency scenarios should be carried out for Operations staff

Yukon Energy Corporation

System Disturbance Report

Date: Feb 12 2006

System Operators: Mike Hannah and Rob Wells

Weather: -1 calm

Percentage of Grid: 18.1%

Pre-Disturbance Generation Setup

20.4	WH4
4.8	WH1
2.2	WH2
6.8	AH1

Total Generation 34.2 Mw

Disturbance

Time	Event
23:11:04	WH4 breaker tripped
23:11:06	S170 S6838 tripped
23:11:07	S150 52--17 tripped

Restoration

23:18:59	AH2 on
23:23:55	WH3on
23:25:40	S150 52-17 closed
23:27:12	S170 S6838 closed

Time Variance

Feeder	Opened / Tripped	Closed	Variance
S170 S6838	23:11:17	23:25:40	14 minutes 23 seconds
S150 52--17	23:11:06	23:27:12	16 minutes 06 seconds

Target /Flags.

27 phase U/V, 5G, 5G1, 121XA,EM and 86 electrical lockout

Comments:

WAF outage caused by burnt bus bar at WH4

Yukon Energy Corporation
System Disturbance Report

Date: Feb 13 2006

System Operators: Mike Hannah and Rob Wells

Weather: -3 calm

Percentage of Grid: 15.1%

Pre-Disturbance Generation Setup

5.5	WH1
5.6	WH2
7.3	WH3
9.8	AH1

Total Generation 28.2 Mw

Disturbance

Time	Event
04:27:00	WH4 breaker tripped
04:27:03	S170 S6838 tripped
04:27:03	S150 52--17 tripped
04:27:31	WH1 tripped
04:27:32	WH2 tripped

Restoration

04:35:48	AH2 on
04:58:44	WH1 on
05:02:47	WH2 on
05:03:49	S150 52-17 closed
05:08:07	S170 S6838 closed
05:10:00	S9402 closed
05:12:00	S9403 closed

Time Variance

Feeder	Opened / Tripped	Closed	Variance
S170 S6838	04:27:03	05:08:07	41 minutes 4 seconds

S150 52-17	04:27:03	05:03:49	36 minutes 46 seconds
S9402	04:27:03	05:10:00	42 minutes 57 seconds
S9403	04:27:03	05:12:00	44 minutes 57 seconds

Target /Flags.

Frequency-ROCOS 81-81R

Comments:

SCC requested a local start up of WH4. Immediately after the breaker closed for WH4 the unit went into reverse power to approx. -10 MW's knocking off WH1 and WH2 on overspeed and tripping S170 S6838 and S150 52-17 on under current.

Yukon Energy Corporation

System Disturbance Report

Date: April 26, 2006

System Operator: Steve Blysak

Weather: 5 c Light breeze

Percentage of Grid:

Pre-Disturbance Generation Setup

AH1	8.7
WH4	17.1
WH3	7.2

Total Generation 38.98 Mw

Disturbance:

Time	Event
21:30:22	u/v alarms at S170
21:30:25	Wh3 tripped elec lockout
21:30:25	Faro 701 open u/v
21:30:25	S150 52-22 open u/v
21:30:25	S150 52-21 open u/v
21:30:25	S150 52-17open u/v
21:30:25	S150 52-18 open u/v
21:30:26	Wh4 open overspeed
21:30:27	S6837 open u/v
21:30:27	S6838 open u/v
21:30:27	S164 52-1 0pen

Restoration

21:42:26	S164 52-1 closed energizing S170 and S150 with Ah1
21:44	FD7 on faro 505 and 507 closed faro Ross river energized
21:45	Ah2 on
21:46:45	S150 52-22 closed 4.44 mw
21:47:52	S150 52-18 closed 3.48 mw
21:50:16	Wh2 on
21:50:03	Wh4 on
21:53:05	S6838 closed 6.00mw
22:01:22	S150 52-17 closed 2.36 mw
22:05:55	S6837 closed 1.2 mw
22:16:24	S150 52-21 closed 2.5 mw

22:33:16	Faro 701 closed
22:33:35	Faro 503 closed Faro back on WAF grid
22:38	Fd7 off

Time Variance

Feeder	Opened / Tripped	Closed	Variance
S150 52-22	21:30:25	21:46:45	16 min 20 secs
S150 52-18	21:30:25	21:47:52	17 min 27secs
S6838	21:30:27	21:53:05	22min 38 secs
S150 52-17	21:30:25	22:01:22	30 min 57 secs
S6837	21:30:27	22:05:55	35 min 38 secs
S150 52-21	21:30:25	22:16:24	45 min 59 secs

Target /Flags.
U/V

Comments:

Outage originated in lewes blvd sub squirrel in brkr bushings need breaker numbers and restoration times from yecl

Yukon Energy Corporation

System Disturbance Report

Date: July 14, 2006

System Operator: Steve Blysak

Weather: 17 degrees and scattered clouds

Percentage of Grid: 100%

Pre-Disturbance Generation Setup

WH4	17.35 Mw
WH2	2.62 Mw
WH3	7.08 Mw
AH1	3.75 Mw

Total Generation 30.80 Mw

Disturbance:

Time	Event
17:14:51	S150 52-15 Closed (by SCC)
17:14:51	S150 T7 Lock-out (Diff trip)
17:14:51	S150 52-1 Open
17:14:51	S150 52-23 Open
17:14:51	S150 52-15 Open
17:14:54	S150 52-17 tripped (u/f)
17:15:26	P130 52-AH1 open (reverse power)
17:16:11	S150 52-22 tripped (by SCC)
17:16:56	S170 S6837 tripped (by SCC)
17:17:02	S170 S6838 tripped (Under/Over Voltage)
17:17:12	S170 52-1 tripped (by SCC)
17:17:22	S150 52-21 tripped (by SCC)
17:17:33	S150 52- 18 tripped (by SCC)
17:17:53	WH3 tripped (elec lockout)
17:19:41	Faro 701 tripped (Under/Over Voltage)
17:21:16	S171 52-1 tripped (by SCC)
17:21:25	S171 52-3 tripped (by SCC)
17:21:41	S171 52-4 tripped (by SCC)
17:22:16	WH4 tripped (Reverse power)
17:22:38	WH2 tripped (by SCC) SCC SS
17:26:57	

Restoration:

17:28:00	FD7 on line
17:28:14	P125 52-WH2 closed (SCC station service back up)

17:28:20	505 closed
17:28:50	507 closed
17:36:47	S171 52-1 Closed (by SCC)
17:37:04	S171 52-3 Closed (by SCC)
17:37:27	S171 52-4 Closed (by SCC)
17:38:46	S150 52-23 Closed
17:38:59	WH2 tripped (elec lockout)
17:39:02	S150 52-1 Closed (by SCC)
17:40:21	WH4 Online
17:43:54	S170 52-1 Closed
17:46:56	S150 52-17 Closed
17:47:30	S150 52-17 (Opened by SCC)
17:51:06	P130 52-AH1 Closed
17:52:35	S150 52-17 Closed
17:54:18	S150 52-18 Closed
17:55:47	S150 52- 22 Closed
17:58:50	WH2 online
17:59:49	S150 52-21 Closed
18:02:32	S170 S6838 Closed
18:08:06	S170 S6837 Closed
18:20:00	WH3 online (locally)
18:20:07	Faro 503 Open
18:20:07	Faro 701 Closed
18:25:20	Faro 503 Closed (synced to System)
18:27:30	P132 52-FD7 Open

Time Variance

Feeder	Opened / Tripped	Closed	Variance
S150 52-17	17:14:54	17:52:35	37 min, 41 sec
S150 52-18	17:17:33	17:54:18	36 min, 45 sec
S150 52- 22	17:16:11	17:55:47	39 min, 36 sec
S150 52-21	17:17:22	17:59:49	42 min, 27 sec
S170 S6837	17:16:56	18:08:06	51 min, 10 sec
S170 S6838	17:17:02	18:02:32	45 min, 30 sec
Faro 505	17:19:41	17:28:20	8 min, 39 sec
Faro 507	17:19:41	17:28:50	9 min, 9 sec
L355, L170 , L171	17:22:38	17:40:21	17 min, 43 sec

Target /Flags:
S164 Panel 171L AC fail relay 74 – 60 fm2 52-2
S164 Panel 172L AC fail relay 74 – 60 fm2 52-1
S164 Panel 170L AC fail relay 74 – 60 fm2 52-3
S150 52-17 Under-frequency
S6838 Under voltage
S6837 Under voltage
WH3 Reverse power
AH1 Reverse power
WH4 Reverse power

Comments: The cause of this disturbance was found to be an incorrect CT wiring on S150 52-15. The breaker had been replaced the week of July 10, 2006. On the return to normal switching one of the last steps was to close this breaker completing the circuit through S150 T7. However once the breaker was closed S150 T7 indicated a

differential trip resulting in breakers S150 52-1, S150 52-15 and circuit switcher S150 52-23 opening. As a consequence of these switches opening the WAF system was split; WH2 and WH3 feed the S150 load and WH4 and AH1 feeding the remaining WAF system. At the time of the disturbance there was approximately 5-6 Mw being imported to S150 through S150 T2. With insufficient generation to supply the load at S150, breaker S150 52-17 tripped on under-frequency, SCC then proceeded to open the remaining breakers at S150 in an attempt to stabilize the system. While opening the S150 breakers WH3 tripped off line on reverse power.

The operator was unaware that the system had been split and responded to the frequency indication in the control center, which was high as WH2 was on line supplying just station service and no S150 load. AH1 had tripped on reverse power at the start of the disturbance. SCC dropped the remaining load by opening S6837 and S170 52-1. The operator still not seeing any affect on the system frequency attempted to trip WH4 off, however the RTU hung up so the operator elected to trip S171 52-1, S171 52-3 and S171 52-4 resulting in WH4 going off line on reverse power.

When additional support arrived the SCC operator indicated that the west spill-gate was closing on its own. A local check of the gate indicated an opening of 4.5 feet with the gate stationary, staff took local control of the gate and raised it to 6 feet. Both the east and west spill gates lower limit alarms were activated, which may have led the operator to believe the gates were closing. WH4 was placed on line and an attempt to closed breaker S150 52-17 (partial 9L load pickup) was made due to poor response by WH4 the breaker was reopened. AH1 was added to the system and the restoration began with no further issues.

Outage Issues:

1. Spill gate closing indication.
2. WH4 load pickup.
3. Automatic front gate orientation
4. WH4 RTU control failures.
5. SCC situational awareness i.e. Split system review

Yukon Energy Corporation

System Disturbance Report

Date: August 1, 2007

System Operator: Myles O'Brien

Weather: 12 degrees scattered clouds

Percentage of Grid: 66%

Pre-Disturbance Generation Setup

WH1	2.56 Mw's
WH2	2.73 Mw's
WH3	6.3 Mw's
WH4	17.01 Mw's
AH2	0.98 Mw's

Total Generation: 29.58 Mw's

Disturbance:

Time	Event
21:37:59	WH4 Breaker Open (Speed Adjust Error of -22.49?)
21:38:01	S170 S6838 Open (U-F Trip)
21:38:02	S150 52-17 Open (U-F Trip)
21:38:08	S150 52-22 Open (U-V Trip)
21:38:12	S150 52-21 Open (U-V Trip)
21:38:14	WH1 Breaker Open (Emergency Stop 86 Electrical Fault)
21:44:50	S164 52-3 Opened by SCC Operator
21:44:54	Faro 701 Open

Restoration:

21:47:35	WD7 Online
21:53:35	FD7 Online
22:09:23	WD5 Online
22:10:04	WH1 Online
22:12:44	S150 52-21 Closed
22:15:28	S150 52-22 Closed
22:24:15	WD3 Online
22:29:44	WD2 Online
22:32:31	S150 52-17 Closed
22:36:57	S170 S6838 Closed
22:46:29	WD1 Online
22:56:59	WD4 Online
23:37:53	S164 52-3 Closed

23:58:19	Faro 503 Closed
00:49:27	L171 89-42-6 Closed (GOI 07-272)
00:54:55	Aish P130 52-F2 Closed (GOI 07-272)

Time Variance

Feeder	Opened / Tripped	Closed	Variance
S170 S6838	21:38:01	22:36:57	58 Minutes 56 Seconds
S150 52-17	21:38:02	22:32:31	54 Minutes 29 Seconds
S150 52-22	21:38:08	22:15:28	37 Minutes 20 Seconds
S150 52-21	21:38:12	22:12:44	34 Minutes 32 Seconds
S164 52-3	21:44:50	23:37:53	1 Hour 53 Minutes 3 Seconds
Faro 701	21:44:54	23:58:19	2 Hours 13 Minutes 25 Seconds

Target /Flags: TBA

Comments: A Governor Speed Adjust error (hydraulic valve failure) caused WH4 to trip offline. WH1 tripped offline due to an electrical fault perhaps caused by voltage discrepancies of the WH4 breaker opening under full load conditions.

S164 52-3 was opened by SCC to gain system stability and aid in restoration. Whitehorse Diesel and WH1, 2 &3 were used for restoration until GOI 07-272 (L171) could be surrendered and returned to normal. Once L171 was returned to normal and AH2 was used to relieve P126 units.

Yukon Energy Corporation

System Disturbance Report

Date: August 27, 2006

System Operator: Myles O'Brien

Weather: 13 degrees and scattered clouds

Percentage of Grid: 50%

Pre-Disturbance Generation Setup

WH4	17.08 Mw
WH3	6.67 Mw
WH2	4.0 Mw
WH1	2.98 Mw

Total Generation: 30.73 Mw

Disturbance:

Time	Event	
11:34:09	S150 52-22	Open (Under voltage)
11:34:10	S170 S6838	Open (UV-OV)
11:34:11	S170 S6837	Open (UV-OV)
11:34:11	S150 52-17	Open (Under voltage)
11:34:15	WH4	Trip (Over speed)

Restoration:

11:39:34	AH1	52 Breaker Close		
11:43:58	S150 52-17	Close	3.87Mw	
12:08:47	S170 S6838	Close	2.57Mw	
12:11:52	S170 S6837	Close	2.08Mw	
12:15:00	S9403	Close	2.08Mw	(Porter Creek Sub #6)
12:17:00	S9402	Close	1.89Mw	(Porter Creek Sub #6)
12:21:00	S7191	Close	2.43Mw	(Services Sub #5)
12:23:00	S7192	Close	1.10Mw	(Services Sub #5)
12:24:00	S7193	Close	2.2Mw	(Services Sub #5)
12:27:00	S8358	Close	3.64Mw	(Mountain View Sub #28)
12:29:00	S8471	Close	1.02Mw	(Mountain View Sub #28)
12:31:00	S8354	Close	1.49Mw	(Mountain View Sub #28)
12:44:10	S150 52-22	Close	5.1Mw	
12:55:52	WD7	Breaker Close		
12:58:00	S6840	Close	0.56Mw	(Marsh Lake & Teslin)

Time Variance:

Feeder	Opened / Tripped	Closed	Variance
S150 52-22	11:34:09	12:44:10	00:10:01
S170 S6838	11:34:10	12:08:47	00:34:37
S170 S6837	11:34:11	12:11:52	00:37:41
S150 52-17	11:34:11	11:43:58	00:09:47

Target /Flags:

Comments:

Yukon Energy Corporation

System Disturbance Report

Date: June 10, 2006

System Operator: Gary McLaughlin

Weather: 14 C, Light breeze

Percentage of Grid: 88%

Pre-Disturbance Generation Setup

AH1	3.5
WH4	17.8

Total Generation 21.3 Mw

Disturbance:

Time	Event
02:19:40	S164 52-1 tripped
02:19:42	S150 52-21 tripped
02:19:42	S150 52-22 tripped
02:19:42	S150 52-17 tripped
02:19:42	S150 52-18 tripped
02:19:43	S6838 tripped
02:19:44	WH4 tripped
02:19:46	S6837 tripped

Restoration

02:28:07	S164 52-1 closed
02:29:24	AH2 on
02:30:39	WH1 on
02:31:07	S150 52-22 closed
02:33:54	S150 52-17 closed
02:34:58	WH3 on
02:35:25	S6838 closed
02:37:12	S15052-18 closed
02:51:46	WH2 on
02:59:27	S150 52-21 closed
03:09:19	S6837 closed

Time Variance

Feeder	Opened / Tripped	Closed	Variance (hh:mm:ss)
S150 52-22	02:19:42	02:31:07	0:11:25
S150 52-18	02:19:42	02:37:12	0:17:30
S6838	02:19:43	02:35:25	0:15:42
S150 52-17	02:19:42	02:33:54	0:14:12
S6837	02:19:46	03:09:19	0:49:33
S150 52-21	02:19:42	02:59:27	0:39:45

Target /Flags.

S150 52-17 under voltage trip
S150 52-18 under voltage trip
S150 52-21 under voltage trip
S150 52-22 under voltage trip
S6837 under voltage trip
S6838 under voltage trip

Comments:

The cause of this disturbance has to date not been determined. S164 52-1 tripped on a distance relay de-energizing L172, WH4 was unable to supply the load at S150 and S170 by itself resulting in an under voltage condition tripping the feeder breakers at each substation. L355, L170 and L171 remained energized and fed from AH1. A line patrol of L172 will be done Monday, June 12, 2006.

Update (June 12, 2006): YECL reports a possible high load contact over the weekend that may have caused this outage. They found a burnt primary conductor in the Marwell area fed from S7192 in the services substation.

Yukon Energy Corporation

System Disturbance Report

Date: June 17 2007

System Operator: Gary McLaughlin

Weather: 17C Thunderstorm with Rain

Percentage of Grid: 35%

Pre-Disturbance Generation Setup

WH1	5.5 mw
WH2	5.4 mw
WH3	8.2 mw
AH1	11.6 mw

Total Generation: 30.70mw

Disturbance:

Time	Event
15:31	Faro 701 Open
15:31	S164 52-3 Open
15:32	S6838 Open
15:32	S150 52-17 Open
15:32	WH2 Mechanical Fault 86N Trip
15:32	WH1 Mechanical Fault 86N Trip

Restoration:

15:36	Faro 507 Open
15:37	Faro 503 Open
15:42	P132 52-FD7 Closed
15:44	Faro 507 Closed
15:43	AH2 on
15:45	Faro 507 Closed
15:50	YECL Clearing Dist Breakers on S6838 and S150 52-17
15:56	WH1 on
15:58	WH2 on
16:12	S150 52-17 closed
16:12	YECL Closing Dist Breakers on S150 52-17
16:25	S6838 closed
16:25	YECL Closing Dist Breakers on S6838
18:18	L170 89-813 Open
18:19	S164 52-3 Closed
18:39	S164 52-3 Open

18:40	L170 89-813 Closed
18:40	S164 52-3 Closed
19:42	Faro 701 closed
19:48	Faro 503 Closed
19:53	P132 52-FD7 Open

Time Variance

Feeder	Opened / Tripped	Closed	Variance
S164 52-3	15:31	18:19	2 hours, 48 min
S164 52-3	18:39	18:40	1 min
S150 52-17	15:32	16:12	40 min
S6838	15:32	16:25	53 min

Target /Flags

Line Distance relay on L170, 89.3 km (ABC instantaneous).
S6838 U/F trip
S150 52-17 U/F trip

Comments:

The cause of this event has been determined to be a lightning strike on L170. Due to the loss of load (U/F breakers) WH1 and WH2 tripped on over-speed, closing the head-gates and delaying the restoration process.

During the restoration the SCC operator asked YECL to clear their distribution breakers fed from S6838; they inadvertently cleared breakers in Mountainview sub fed from S6837 causing outage to their customers.

When L170 was normal YECL dispatch was unable to call CD1 and found out from staff at Carmacks Hotel that it was still running when should have already shut down. Dispatch asked SCC for some direction on what to do, if they should leave it run all night or send someone out.

Yukon Energy Corporation

System Disturbance Report

Date: July 14, 2007

System Operator: Mike Hannah

Weather: 21degrees scattered clouds

Percentage of Grid: 80%

Pre-Disturbance Generation Setup

WH1	5.25 Mw's
WH2	5.2 Mw's
WH3	7.7 Mw's
AH1	9.5 Mw's

Total Generation: 27.65 Mw's

Disturbance:

Time	Event
18:39:15	13L Load Pick Up (1.744 Mw) – Low Hz
18:40:01	AH1 tripped
18:40:03	S150 52-17 open
18:40:04	S6838 open
18:40:17	S150 52-22 open
18:44:03	S150 52-21 open
18:44:15	S6837 tripped by SCC Operator
18:50:38	WH3 tripped off line

Restoration:

18:47:22	AH2 on
18:47:37	S150 52-22 closed
19:10:30	WH3 on
19:17:51	S6837 closed
19:22:54	S150 52-21 closed
19:25:16	S150 52-17 closed
19:41:47	S6838 closed

Time Variance

Feeder	Opened / Tripped	Closed	Variance
S150 52-17	18:40:03	19:25:16	45 minutes 13 seconds
S170 S6838	18:40:04	19:41:47	1 hour 1 minute 43 seconds
S150 52-22	18:40:17	18:47:37	7 minutes 20 seconds
S150 52-21	18:44:03	19:22:54	38 minutes 51 seconds

S170 S6837	18:44:15	19:17:51	33 minutes 36 seconds

Target /Flags: AH1 - 94 non lockout 86R and 1CS1. AH2 – 81R and 30AL

Comments: Cause has yet to be determined, YECL restoring power in Copper Ridge area when outage occurred.

Yukon Energy Corporation

System Disturbance Report

Date: Aug 14, 2007

System Operator: Mike Hannah

Weather: 24 degrees and sunny

Percentage of Grid: 100%

Pre-Disturbance Generation Setup

WH1	4.2 MW's
WH2	4.7 MW's
WH3	7.7 MW's
WH4	17.2 MW's

Total Generation: 33.80 MW's

Disturbance:

Time	Event
13:16:31	WH4 tripped off line
13:16:37	S150 52-22 open
13:16:37	S150 52-17 open
13:16:39	S170 S6838 open
13:16:40	S150 52-21 open
13:16:40	S170 S6837 open
13:16:45	S150 52-18 open
13:16:50	WH2 tripped off line
13:16:51	WH1 tripped off line
13:16:55	Faro 701 open
13:17:04	S167 52-2 open
13:17:05	WH3 tripped off line
13:19:43	S164 52-2 open by SCC
13:19:52	S164 52-3 open by SCC
13:20:09	Faro 503 open
13:24:58	S150 52-22 open

Restoration:

13:21:17	AH2 on line
13:22:03	S164 52-2 closed
13:23:30	P132 52- FD7 on line
13:24:56	S150 52-22 closed
13:27:26	AH1 on line
13:27:47	S150 52-22 closed

13:30:53	S170 S6838 closed
13:33:53	WH1 on line
13:34:24	S170 S6837 closed
13:35:28	WH2 on line
13:36:26	S164 52-3 closed
13:44:37	S150 52-17 closed
13:47:57	S150 52-21 closed
13:48:19	WH3 on line
13:55:43	S150 52-18 closed
13:57:26	Faro 701 closed
13:58:10	Faro 503 closed
14:00:11	P132 52-FD7 off line
14:54:31	S167 52-2 closed

Time Variance

Feeder	Opened / Tripped	Closed	Variance
S150 52-22	13:16:37	13:24:56	8 minutes 19 seconds
S150 52-22	13:24:58	13:27:47	2 minutes 49 seconds
S150 52-17	13:16:37	13:44:37	28 minutes
S170 S6838	13:16:39	13:30:53	14 minutes 14 seconds
S150 52-21	13:16:40	13:47:57	31 minutes 17 seconds
S170 S6837	13:16:40	13:34:24	17 minutes 44 seconds
S150 52-18	13:16:40	13:55:43	39 minutes 3 seconds
Faro 701	13:16:55	13:57:26	40 minutes 31 seconds
S167 52-2	13:17:04	14:54:31	37 minutes 27 seconds
S164 52-2	13:19:43	13:22:03	2 minutes 20 seconds
S164 52-3	13:19:52	13:36:26	16 minutes 34 seconds
Faro 503	13:20:09	13:58:10	38 minutes 1 second

Target /Flags: Under frequency and under voltage is the primary reason that all of the feeders tripped open. Could not retrieve the flags/targets from WH4 as someone reset before the data could be down loaded.

Comments: The governor speed adjust motor for WH4 went to -20.54 causing the unit to trip off line. WH4 to stay out of service until speed adjust problems can be rectified.

Yukon Energy Corporation

System Disturbance Report

Date: September 15, 2007

System Operator: Mike Sage

Weather: 3 Degrees with scattered showers

Percentage of Grid: 100%

Pre-Disturbance Generation Setup

WH1	2.47
WH2	2.24
WH4	17.11

Total Generation: 21.82

Disturbance:

Time	Event
03:39:26	WH4 Open
03:39:28	S150 52-22 UV –Tripped - Open
03:39:29	S170 S6838 UV-OV – Tripped – Open
03:39:29	WH1 - Open
03:39:30	WH2 - Open
03:39:31	S170 S6837 – Open
03:39:31	S150 52-21 UV – Tripped
03:39:31	S150 52-17 UV – Tripped
03:39:30	Faro 701 - Open
03:39:32	S150 52-18 UV – Tripped
04:29:21	Faro 503 – Open (SCC)

Restoration:

03:50:47	SCC – Open – S164 52-2
03:51:03	SCC – Open – S164 52-3
03:57:31	AH1 – Closed
03:59:15	S164 52-2 – Closed
04:05:20	WH3 – Closed
04:07:54	AH1 - Trip (reverse power)
04:09:48	WH3 - Tripped SCC (system swinging)
04:12:07	S164 52-2 – Open (SCC)
04:12:31	AH1 - Closed
04:13:34	S164 52-2 – Closed (SCC)
04:14:10	WH3 - Closed
04:14:44	S150 52-18 – Closed

04:18:08	WH2 – Closed
04:21:11	WH1 – Closed
04:22:55	S150 52-22 – Closed
04:33:36	S150 52-17 – Closed
04:51:33	S170 S6838 – Closed
04:57:54	S167 52-2 – Closed
05:04:48	S164 52-3 – Closed
05:06:01	Faro 701 – Closed
05:06:40	Faro 503 – Dead Bus Closed
05:46:33	S167 52-2 - Closed

Time Variance

Feeder	Opened / Tripped	Closed	Variance
S150 52-22	03:39:28	04:22:55	00:43:27
S170 6838	03:39:29	04:51:33	01:12:04
S170 6837	03:39:31	04:26:07	00:47:24
S150 52-21	03:39:31	04:41:30	01:01:59
S150 52-17	03:39:31	04:33:36	00:54:05
Faro 701	03:39:30	05:06:01	01:26:31
S150 52-18	03:39:32	04:14:44	00:35:12
Faro 503	03:39:21	05:06:38	01:27:17

Target /Flags:

S150 52-18 Under-Voltage
S150 52-17 Under-Frequency
S150 52-21 Under-Voltage
S150 52-22 Under-Voltage
S6837 Under-Voltage
S6838 Under-Frequency
WH1 Electrical Lockout - R6 Fault
WH2 Electrical Lockout – R6 Fault
WH4 - No Flags
701 Under-voltage

Comments:

The cause of this disturbance was found to be a failed coil in the WH4 creep detector resulting in a DC system fault taking the unit off line, with insufficient generation the system collapsed. During the restoration S164 52-3 and S164 52-2 were opened by SCC and AH1 dead-bus closed energizing the system. WH3 was synchronized to AH1, however without any load AH1 tripped on reverse power. WH3 began to swing and was tripped off line. The same steps were repeated and S150 52-18 was closed supplying sufficient load to stabilize the system; the restoration then proceeded. WH4 remained OOS during the restoration, the unit was returned to service and placed on line 8:54. AH2 was returned to service (annual PM) for system security.
The L355 Haines Junction line failed to hold during the restoration, there were reports of rain in the area at the time. On the third attempt the breaker held, however at YECL's discretion Haines Junction remained on diesel. The fault detectors were checked and where flashing on the north phase. The YECL serviceman later reported a blown arrestor on the load side of the metering tank. Repairs were made and Haines Junction synched back to the grid.

Outage Issues:

- The VFD on the east spill gate had problems with the resistors overheating, making the gate inoperable. A mobile diesel was brought on sight and the inch drive enabled. Could this be related to the voltage supply from the intake diesel? Is there still an issue with this gate jamming, because when the gate was tested it would not move remotely until a local operation was performed?

- WD7 started, but would not go on line. Problem was found to be a power supply issue, which was changed out. There were reports of odors from the control cabinet?

- WD6 was started remotely and placed on line but only loaded up to 1.66 Mw, the local operator was able to load the unit up. The unit failed to respond to a remote stop command and again had to be operated and shutdown locally.

- With the fuel line work at the Whitehorse diesel plant and the potential to have to run diesel if repairs could not be completed on WH4 (AH2 was under a WAP) fuel supply became a concern. Although not required attempts to contact the fuel supplier took time only to find there was only one driver available and he was delivering to Alaska from Dawson.

- 701 opened on under-voltage, however 503 was opened by SCC and should have opened with 701?

- The failure of a creep detector should not kill the unit DC causing the unit to shutdown!

Yukon Energy Corporation

System Disturbance Report

Date: November 15, 2007

System Operator: Steve Blysak

Weather: 0 Degrees and calm

Percentage of Grid: 67%

Pre-Disturbance Generation Setup

AH2	13.5 Mw
WH2	5.5 Mw
WH1	5.5 Mw
WH4	16.5 Mw

Total Generation: 41 Mw

Disturbance:

Time	Event
14:49:10	S171 52-1 Trip
14:49:10	S171 52-3 Trip
14:49:10	S171 52-4 Trip
14:49:14	S170 S6838 Open U/F - Trip
14:49:15	WH4 trip (86 Lockout) - Overspeed
14:49:15	S150 52-22 U/V - Trip
14:49:17	S150 52-21 U/V - Trip
14:49:17	S150 52-17 U/V - Trip
14:49:56	WH1 trip (Electrical lockout) - Overspeed
14:50:03	S150 52-18 Open (by Operator)
14:50:06	WH2 trip (Electrical lockout) - Overspeed

Restoration:

14:53:49	S171 52-3 closed
14:54:21	S171 52-4 closed
14:59:01	S171 52-1 closed
15:00:00	WH3 On
15:03:31	WH2 On
15:05:45	S150 52-17 closed 1.87mw
15:06:08	WH1 on
15:08:00	S6822 Closed 2 mw
15:09:00	S6817 Closed 1.87 mw
15:11:51	S150 52-18 Closed 1.85mw
15:14:00	S6838 Closed 2.65 mw

15:16:53	150 52-21
15:23:00	S1016 Closed 4.79 Mw
15:25:00	S1011 Closed 3 Mw
15:27:00	S150 52-22 Closed 5.41 Mw
15:30:00	S8615 Closed 3.18Mw
15:34:00	S9403 Closed 3.18 Mw
15:35:00	S9402 Closed 1.39 Mw

Time Variance

Feeder	Opened / Tripped	Closed	Variance
S171 52-3	14:49:10	14:53:49	0:04:39
S171 52-4	14:49:10	14:54:21	0:05:11
S171 52-1	14:49:10	14:59:01	0:09:51
S170 S6838	14:49:14	15:14:00	0:24:46
S150 52-22	14:49:15	15:27:00	0:37:45
S150 52-21	14:49:17	15:16:53	0:27:36
S150 52-17	14:49:17	15:05:45	0:16:28
S150 52-18	14:50:03	15:11:53	0:21:50
S6822	14:49:17	15:08:00	0:18:43
S6817	14:49:17	15:09:00	0:19:43
S1016	14:49:17	15:23:00	0:33:43
S1011	14:49:17	15:25:00	0:35:43
S8615	14:49:14	15:30:00	0:40:46
S9403	14:49:14	15:34:00	0:44:46
S9402	14:49:14	15:35:00	0:45:46

Target /Flags:

WH1 – Overspeed
WH2- Over-Voltage
WH4-Over-Voltage and Overspeed

S150 52-17 – Under-Frequency
S150 52-18- Under-Voltage
S150 52-21- Under-Voltage
S150 52-22- Under-Voltage
S170 S6838 – Under-Frequency
EMDS – 4-5-6- All Reverse Power

Comments: Workers were commissioning the new RTU in S171 and reset a relay this caused S171 52-3 S171 52-4 and S171 52-1 to open causing a split system. Haines Junction,, Faro, and S6837 stayed energized by AH2 the 34.5 system collapsed from u/f and u/v do to a lack of generation when #4 went Down

Yukon Energy Corporation

System Disturbance Report

Date: May 04 2008

System Operator: Mike Sage

Weather: 4 c calm snow/ rain earlier in the evening

Percentage of Grid: 100%

Pre-Disturbance Generation Setup

AH1	5.89 Mw
AH2	6 Mw
WH1	5 MW
WH2	5.9 Mw
WH3	8.89 Mw

Total Generation: 31.6 mw

Disturbance:

Time	Event
22:49:24	S164 52-1-Tripped - Open
22:49:27	S170 6838-Tripped - Open U/F load shed stage #1
22:49:27	S150 52-17-Tripped - Open U/F load shed Stage #2
22:53:32	S170 6837 - Open
22:53:33	WH1 – Open Elec 86 lockout
22:53:58	AH2 52-1 – Open (SCC)
22:56:09	S150 52-18 – Open (SCC)
22:57:15	S170 52-1 – Open (SCC)
22:57:39	S164 52-3- Open (SCC)
22:57:39	Faro 701 Breaker – Open (SCC) (Faro Islanded Locally)
23:06:36	S150 52-17 – Tripped – Open
23:06:48	WH2 – Open (SCC) elect 86 lockout
23:06:57	WH3 – Open (SCC) elect 86 lockout
23:06:57	S150 52-22 – Tripped –Open
23:07:02	S150 52-21 – Tripped – Open
23:28:24	S171 52-3 – Open (SCC)
23:28:37	S171 52-4 – Open (SCC)
23:32:18	S170 S9815 – Open (SCC)
23:52:00	S150 52-1 – Open (SCC)
23:59:20	S150 52-13 – Open (SCC)
23:59:22	S150 52-11 – Open (SCC)
00:29:26	S150 52-12 – Open (SCC)
00:46:34	S170 52-2 – Open (SCC)

Restoration:

23:10:30	AH2 - On
23:26:57	Faro P132 52-FD7 – Closed (Faro Islanded)
23:40:42	S170 S6837 - Close
00:29:42	WH3 – On
00:32:28	S150 52-1 – Close
00:32:50	S150 52-15 – Close
00:54:14	WH2 – On
00:56:17	S150 52-21 – Close
01:03:47	WH1 – On
*01:04:02	Loop Close – S9530
01:04:19	S150 52-18 – Close
01:12:07	WD1 – On
01:12:23	S150 52-17 – Close
01:20:51	WD2 – On
01:48:42	S170 S9815 – Close
01:50:09	S170 S6838 – Close
01:59:03	WD6 – On
02:13:37	S150 52-22 – Close
02:16:26	WD5 – On
02:22:55	WD4 – On
02:26:03	S164 52-3 – Close
03:12:28	Faro 701 Breaker – Close
04:29:10	S171 52-3 – Close
04:49:09	S164 52-1 – Close
05:31:15	S170 52-2 - Close

Time Variance

Feeder	Opened / Tripped	Closed	Variance
S164 52-1	22:49:24	04:49:09	5:59:44
S170 S6838	22:49:27	01:50:09	3:00:41
S150 52-17	22:49:27	01:12:23	2:22:55
S170 S6837	22:53:32	23:40:42	0:47:09
S150 52-18	22:56:09	01:04:19	2:08:09
Faro 701 Breaker	22:57:39	03:12:28	4:14:48
S150 52-22	23:06:57	02:13:37	3:06:39
S150 52-21	23:07:02	00:56:17	1:49:14
S170 S9815	23:32:18	01:48:42	2:16:23
S150 52-1	23:52:00	00:32:28	0:40:27
S150 52-15	23:52:03	00:32:50	0:40:46
S170 52-2	00:46:34	05:31:15	4:44:41

Target /Flags:

- S170 S6838 Under-Frequency
- S150 52-17 Under-Frequency
- WH1Electrical Lockout – R6 Fault
- WH2 Electrical Lockout –R6 Fault
- S150 52-22 Under-Voltage
- S150 52-21 Under-Voltage
- S150 52-18 Under-Voltage
- WH3 Electrical Lockout/Over speed

Comments:

The cause of this disturbance was found to be shot insulators on L172 transmission line between S171 and S164 substations. At this critical juncture of the system, it produced a split system and without insufficient generation from the Aishihik plant the system collapsed. Even after saving some of the grid with WH2 and WH3 it became unstable and was decided to open the breakers on the remaining two hydro's and start over. SCC tried to restore station service from Aishihik by closing S164 52-1 but failed, one unit remained online and the other running speed no load. Restored station service through P-125 with some switching involved.

- The VFD on the west spill gate failed while outage was in progress, it was reset twice. Not sure of the problem at this time.

- Lost RTU to Aishihik and operator had to look after units and local breakers during this outage.

Yukon Energy Corporation

System Disturbance Report

Date: May 16, 2008

System Operator: Myles O'Brien

Weather: 7C Cloudy

Percentage of Grid: 34%

Pre-Disturbance Generation Setup

AH1	8 Mw
AH2	8 Mw
WH4	12 Mw
WH1	4.3 Mw
WH2	2.2 Mw

Total Generation: 34.5 mw

Disturbance:

Time	Event
18:05:54	WH4 Governor Trouble Alarm
18:16:15	WH4 Breaker Open (Tripped)
18:16:17	S170 S6838 Open (Tripped U/F)
18:16:20	S150 52-17 Open (Tripped U/F)

Restoration:

18:08:05	WH1 Online
18:26:50	WH3 Online
18:35:14	S150 52-17 Closed
18:44:57	S170 S6838 Closed

Time Variance

Feeder	Opened / Tripped	Closed	Variance
S170 S6838	18:16:17	18:44:57	28 min 40 sec
S150 52-17	18:16:20	18:35:14	18 min 54 sec

Target /Flags:

Comments: WH4 Governor Trouble Alarmed and load was immediately reduced by SCC while WH1 was brought online and Darrel Johnson (On-Call Mechanic) was called in. Ten minutes and twenty-one seconds later WH4 tripped offline with 12Mw. Restoration was conducted with WH3, WH1, WH2, AH1, AH2 and YECL in S170 and Riverdale Sub.

Yukon Energy Corporation

System Disturbance Report

Date: May 22, 2008

System Operator: Mike Hannah

Weather: 18 degrees and scattered cloud

Percentage of Grid:

Pre-Disturbance Generation Setup

WH1	5.75 Mw
WH2	6.00 Mw
WH3	8.90 Mw
AH1	6.30 Mw
AH2	6.40 Mw

Total Generation: 33.35 Mw

Disturbance:

Time	Event
18:10:00	S170 S6838 U/F trip
18:10:03	WH3 Breaker open

Restoration:

18:33:00	S9402 open (YECL)
18:34:00	S9403 open (YECL)
18:35:18	S6838 closed
18:35:30	S9403 closed (YECL)
18:36:30	S9402 closed (YECL)

Time Variance

Feeder	Opened / Tripped	Closed	Variance
S6838	18:10:00	18:35:18	25 minutes and 18 seconds

Target /Flags: 32 on the Beckworth

Comments: At 18:09:56 WH3 began to shed load causing S6838 to trip on under frequency at 18:10:00. The cause of WH3 load shedding and eventual unit breaker trip was due to either a speed sensor issue or improper feedback from the LVDT to the ram.

Yukon Energy Corporation

System Disturbance Report

Date: Oct 05 2008

System Operator: Steve Blysak

Weather: Light Rain 5 c

Percentage of Grid: 100 %

Pre-Disturbance Generation Setup

WH4	17 Mw
WH1	3.3 Mw
WH2	2 Mw
AH 1	9 Mw

Total Generation: 31.3 Mw

Disturbance:

Time	Event
00:06:13	WH4 Gov Status Alarm
00:06:38	P127 52-WH4 Open (Gen 86 lockout)
00:06:40	S150 52-17 Open (U/F Trip)
00:06:42	506 Open
00:06:43	S6838 Open (U/F trip)
00:06:43	S150 52-22
00:06:44	WH4 Gen Nonlockout trip
00:06:45	S6837 Open
00:06:45	701 Open (U/V Trip)
00:06:46	P130 52- AH1 Open
00:06:46	AH1 Non-lockout Trip
00:06:46	S150 52-21 Open (U/V Trip)
00:06:46	S150 52-18 Open (U/V Trip)
00:06:47	WH1 52-1 Open (Elect fault 86E trip)

Restoration:

00:10:32	S164 52-2 Open (by sys op)
00:11:20	AH2 On
00:14:17	AH1 On
00:15:53	S164 52-3 Open
00:15:59	S164 52-2 Closed Energized 138 kv (except L170)
00:25:01	WH3 52-1 Closed
00:27:20	503 Open
00:27:32	AH2 nonlockout trip (reverse power)

00:28:09	507 Open by GJ
00:31:44	WH2 52-1 Closed
00:32:17	FD5 On
00:36:19	506 Closed
00:36:26	506 Open
00:36:39	507 Closed
00:38:02	S150 52-18 Closed
00:39:45	S150 52-17 Closed
00:42:08	S170 S6838 Closed
00:42:16	FD3 On
00:42:46	WH1 52-1 Closed
00:45:57	506 Closed
00:47:40	S170 S6837 Closed
00:49:59	S150 52-22 Closed
00:56:59	S164 52-3 Opened
00:59:40	S150 52-21 Closed
01:10:27	AH2 On
02:07:10	503 Closed (WAF Sys back to Normal)
03:56	All Yecl Customers restored

Time Variance

Feeder	Opened / Tripped	Closed	Variance
S150 52-17	00:06:40	00:39:45	33 min 5 secs
S150 52-22	00:06:43	00:49:59	43 min 16 secs
S150 52-18	00:06:46	00:38:02	31 min 16 secs
S150 52-21	00:06:46	00:42:46	36 min
S170 S6838	00:06:43	00:42:08	35min 25 secs
S170 S6837	00:06:45	00:47:40	40 min 55 secs
Faro 505	00:06:45	00:32:17	25 min 32 secs
Faro 506	00:06:45	00:36:39	29 min 54 secs
Faro 507	00:06:45	00:45:57	39 min :12
S164 52-3	00:06:45	00:56:59	50 min 14 secs

Targets/Flags: WH4 5G 5G1 See Ed Chaplin for details

Comments: WH4 Gov status alarm.... WH4 trip 25 seconds later cause was a stuck proportional Valve.... the valve has been replaced unit placed back online on Oct 08 2008 WH1 tripped on over-current due to being last unit online and trying energize sys on its own. Yecl restored last customers at 03:56

Yukon Energy Corporation

System Disturbance Report

Date: Oct 12 2008

System Operator: Steve Blysak

Weather: sunny calm 7 c

Percentage of Grid: 100 %

Pre-Disturbance Generation Setup

WH4	19.3 Mw
WH1	5.5 Mw
AH 1	7 Mw
AH2	4 Mw

Total Generation: 35.8 Mw

Disturbance:

Time	Event
11:22:06	WH4 Gov Status Alarm
11:22:33	P127 52-WH4 Open (Gen 86 lockout)
11:22:35	S6838 Open (U/F trip)
11:22:38	S150 52-17 Open (U/F Trip) (U/F trip)
11:22:41	506 Open
11:22:42	P130 52- AH1 Open
11:22:42	P130 52- AH2 Open
11:22:45	S150 52-21 Open (U/V Trip)
11:22:45	S150 52-22 Open (U/V)
11:22:45	S150 52-18 Open (U/V Trip)
11:22:46	701 Open (U/V Trip)
11:22:51	WH1 52-1 Open (Elect fault 86E trip)
11:22:56	S9815 Open
11:22:?	S6837 Open (did not report when opened)

Restoration:

11:25:56	S164 52-2 Open (by sys op)
11:26:30	AH1 On
11:27:13	S164 52-3 Open
11:27:30	S164 52-2 Closed Energized 138 kv (except L170)
11:34:28	503 Open (by G Jones)
11:37:48	Fd 7 on
11:38:32	WH2 52-1 Closed
11:39:28	S170 S9815 Closed
11:39:44	506 closed by GJ
11:47:45	WH1 52-1 Closed
11:52:29	S150 52-17 Closed
11:58:33	AH2 On
12:01:43	S170 S6838 Closed
12:04:11	WH3 52-1 Closed
12:07:24	S170 S6837 Closed
12:11:22	S164 52-3 Closed
12:13:44	S150 52-21 Closed
12:25:03	S150 52-18 Closed
12:30:00	S150 52-22 Closed
12:58:26	701 Closed
13:05:00	503 Closed (WAF Sys back to Normal
13:05:04	Fd7 Off

Time Variance

Feeder	Opened / Tripped	Closed	Variance
S150 52-17	11:22:38	11:52:29	29 min 51 secs
S150 52-22	11:22:45	12:30	1 hr 7 min 15 secs
S150 52-18	11:22:45	12:25:03	1 hr 2min18 sec
S150 52-21	11:22:45	12:13:44	50 min 59 secs
S170 S6838	11:22:35	12:01:43	39min 8 secs
S170 S6837	11:22:36	12:07:24	44min 48 sec
Faro 505	11:22:41	11:37:48	15min 7sec
Faro 506	11:22:41	11:39:44	17 min 3 secs
Faro 507	11:22:41	11:37:48	15 min 7 secs
S164 52-3	11:22:41	12:11:22	48min 41 secs
S170 S9815	11:22:56	11:39:28	16min 32 min

Targets/Flags: WH4 5G 5G1 See Ed Chaplin for details
Comments: Wh4 Gov status alarm.... WH4 trip 20 seconds later cause was a stuck proportional Valve

Yukon Energy Corporation
System Disturbance Report

Date: Oct 13 08

System Operator: Steve Blysak

Weather: 3 C calm sunny

Percentage of Grid: +100%

Pre-Disturbance Generation Setup

AH1	8 Mw
AH2	8.5 Mw
WH1	5.6 Mw
WH2	5.5 Mw
WH3	8.2 Mw

Total Generation: 35.8 Mw

Disturbance:

Time	Event
09:11:13	S6838 Open (u/f)
09:11:14	S150 52-17 Open (u/f)
09:11:17	WH3 52-1 Open (86 E)
09:11:32	P130 52-AH1 open (non lockout)
09:11:32	P130 52-AH2 open (non lockout)
09:11:47	S170 S9815 Open
09:11:36	S150 52-22 Open (u/v)
09:11:38	S150 52-21 Open (u/v)
09:11:42	WH1 Open (86 E)
09:11:54	WH2 Open (tripped by sys op)
09:11:56	S150 52-18 Open (u/v)
09:11:57	S150 52-17 (u/v)
09:11:58	S170 S6837 Open (u/v)
09:11:35	506 Open (u/v)

Restoration:

09:13:34	S164 52-2 Open (by sys op)
09:13:42	S164 52-3 Open (by sys op)
09:15:29	AH1 On
09:15:46	S164 52-2 Closed (energizing S170 and S150 SCC SS)
09:18:57	503 Open (by Gary Jones)
09:22:19	FD7 Closed
09:23:40	506 Closed
09:25:22	WH1 52- 1 Closed
09:29:50	WH2 52-2 Closed
09:32:39	S150 52-22 Closed
09:34:28	S170 S6838 Closed
09:36:08	P130 52 AH1 Open (86E Lockout trip)
09:36:09	S170 S6838 Open
09:36:17	S150 52-22 Open
09:43:33	AH1 ON
09:43:44	S150 52-22 Closed
09:46:16	S6838 Closed
09:47:59	S6838 Open
09:48:00	P130 52 AH1 Open (86E Lockout trip)
09:48 :01	SCADA Down ups probs
09:48:07	WH1 52-1 Open (86E Lockout trip)
09:49:07	WH2 52-1 (trip by local op)
09:48:07	S150 52-22 Open (u/v trip)
09:50:00	P130 52 -AH2 Closed (by operator R.K.)
10:07:07	WH1 52-1 Closed
10:31:00	WH2 52-1 Closed
10:34:00	WH3 52-1 Closed
10:40:00	SCADA back up
10:45:03	S150 52-18 Closed
10:50:59	S150 52-22 Closed
10:52:24	S150 52-21 Closed
11:06:26	P130 52- AH1 Closed
11:14:16	P130 52 AH1 Open
11:15:02	S6838 Closed
11:16:31	S6837 Closed
11:17:17	P130 52- AH1 Closed
11:29:50	S164 52-3 Closed
11:47:23	S170 S9815 Close
12:15:00	S167 52-2 Closed (energizing L355)
14:18:12	503 Closed YEC sys back to normal

Time Variance

Feeder	Opened / Tripped	Closed	Variance hr/min/sec
S150 52-22	09:11:36	09:32:39	0:21:03
S170 S6838	09:11:13	09:34:28	0:23:15
S150 52-22	09:36:17	09:43:44	0:07:27
S170 S6838	09:36:09	09:46:16	0:10:07
S150 52-22	09:48:07	10:50:59	1:02:52
S150 52-21	09:11:36	10:52:24	1:40:48
S150 52-18	09:11:56	10:45:03	1:33:07
S150 52-17	09:11:14	10:35:36	1:24:22
S170 S6838	09:47:59	11:15:02	1:27:03
S170 S9815	09:11:47	11:47:23	2:35:36
505	09:11:35	09:22:19	0:10:44
506	09:11:35	09:23:40	0:12:05
507	09:11:35	09:22:19	0:10:44

Targets/Flags: AH1-94 non 86 -Neg seq o/c –phase u/v
AH2- Phase u/v-81 81R Freq o/u
WH1-WH2 -WH3 see attached target list

Comments: The WH3 digital governor lost its gate position indication causing the unit to shutdown, the unit breaker tripped on reverse power (timed). In combination with the loss of generation from WH3 and the reverse power (> 9 Mw) the unit absorbed, the system frequency dropped enough to initiate the under-frequency protected breakers to trip. This load loss was not enough to recover the system frequency, both Aishihik units tripped off line. The system restoration was longer than normal due to WH4

Yukon Energy Corporation

System Disturbance Report

Date: Nov 12 2008

System Operator: Steve Blysak

Weather:

Percentage of Grid: 100 %

Pre-Disturbance Generation Setup

WH4	17.00 mw
WH1	4.31 mw
WH2	5.2 mw
AH 1	7.00 mw
AH2	7.54 mw

Total Generation:

Disturbance:

Time	Event
15:28:50	WH4 gov speed adjust Lo Lo -21.538 ????
15:28:53	S170, S6838 Open u/f
15:28:55	S150, 52-17 Open u/f
15:29:00	P127 52-WH4 Open
15:29:11	WH1 52-1 Open
15:29:16	S170, 6837 Open
15:29:20	S170 9815 Open
15:29:26	P130 52-AH1
15:29:26	P130 52-AH2
15:29:26	Faro 506 Open u/v
15:29;26	S150 52-21 u/v
15:29:26	S150 52-22 u/v
15:29:26	S150 52-18
15:30:44	S164 52-3 Open tripped by op
15:31:01	WH2 52-1 Open tripped by op

Restoration:

15:33:16	AH1 On
15:38:01	WH1 On
15:38:41	S9815 Closed
15:42:16	WH2 On
15:45:13	S6837 Closed
15:53:13	S150 52-21 Closed
16:01:59	AH2 On
16:03:33	WH3 On
16:05:33	S150 52-22 Closed
16:06:52	S170 S6838 Closed
16:08:02	S150 52-18 Closed
16:09:40	S150 52-17 Closed
16:13:31	WD5 on
16:14:38	S164 52-3 Closed
16:16:39	Faro 503 Closed
16:16:54	Faro 506 Closed
16:16:39	Faro 507 Closed
16:19:40	WD6 On

Time

Feeder	Opened / Tripped	Closed	Variance
S170, S6838	15:28:53	16:06:52	0:37:59
S150, 52-17	15:28:55	16:09:40	0:40:45
S170, 6837	15:29:16	15:45:13	0:15:57
S170 9815	15:29:20	15:38:41	0:09:21
Faro 506	15:29:26	16:16:54	0:47:28
Faro 507	15:30:44	16:16:39	0:45:55
S150 52-21	15:29:26	15:53:13	0:23:47
S150 52-22	15:29:26	16:05:33	0:36:07
S150 52-18	15:29:26	16:08:02	0:38:36
S164 52-3	15:30:44	16:14:38	0:43:54

Targets/Flags:

Comments:

Yukon Energy Corporation
System Disturbance Report

Date: Dec 1/08

System Operator: Mike Sage

Weather: -8 degrees light snow

Percentage of Grid: 100%

Pre-Disturbance Generation Setup

WH4	Off
WH1	5.5 Mw
WH2	5.5 Mw
WH3	8.3 Mw
AH1	12.15 Mw
AH2	12.15 Mw
WD6	2.4 Mw

Total Generation: 46 Mw

Disturbance:

Time	Event
14:29:22	S167 T1 87 differential
14:29:22	P130 52-F2 – Open
14:29:22	S167 52-1 – Open
14:29:24	Faro Breaker 506 – Open
14:29:24	S170 S6838 – Tripped – U/F
14:29:26	S170 52-17 – Tripped – U/F
14:29:39	WH1 – Open – 86E
14:30:08	(SCC) Open – S150 52-18
14:30:17	(SCC) Open – S150 52-22
14:30:24	S170 S9815 – Open
14:30:27	WD6 – Open
14:31:32	(SCC) Open –AH1 52 Breaker
14:33:13	WH3 – Open -86E
14:33:19	S150 52-21 – Open – Under voltage
14:33:32	WH2 – Open – (Locally by Ed Peake)
14:33:32	Faro 701 Breaker – Open
14:35:24	Faro 503 Breaker – Open (Locally)
14:36:55	S164 52-3 – Open (SCC)
14:36:55	S2254 52-TR - Open

Restoration:

14:38:01	WH4 – Close
14:38:37	Faro P132 52-FD7 – Close
14:39:35	Faro 506 Breaker – Close
14:39:51	S150 52-17 – Close
14:41:50	S170 S9815 Breaker – Close
14:51:46	WD4 – Close
14:54:11	S170 S6837 – Close
14:58:49	S150 52-21 – Close
15:11:09	WD1 – Close
15:19:05	WD7 – Close
15:20:35	WH2 – Close
15:24:37	WH3 – Close
15:24:55	S164 52-3 –Close
15:25:20	Faro Breaker 701 – Close
15:26:55	S150 52-22 – Close
15:29:05	WD2 – Close
15:33:16	S150 52-18 – Close
15:37:29	Faro Breaker 503 – Close
15:41:53	Faro FD5 – Close
15:42:23	S170 S6838 – Close
15:45:12	WH1 – Close
15:45:43	WD5 – Close
21:00:00	S254 52-TR - Close

Time Variance

Feeder	Opened / Tripped	Closed	Variance hr/min/sec
Faro Breaker 506	14:29:24	14:39:35	0:10:11
S170 6838	14:29:24	15:42:23	1:12:59
S170 52-17	14:29:26	14:39:51	0:10:25
S150 52-18	14:30:08	15:33:16	1:03:08
S150 52-22	14:30:17	15:26:55	0:56:38
S170 S9815	14:30:24	14:41:50	0:11:26
S150 52-21	14:33:19	14:58:49	0:25:30
Faro Breaker 701	14:33:32	15:25:20	0:51:48
Faro Breaker 503	14:35:24	15:37:29	1:02:05
S164 52-3	14:36:24	15:24:55	00:48:31
S254 52-TR	14:36:55	21:00:00	6:23:05

Targets/Flags: S250 T1 back up protection relay, A phase fault/ground fault 51 over current at 15:39:25.
60.53 Hz
A Phase-364 amp
B Phase-12 amp
C Phase-17 amp
Neutral-369 amp\
Ground-370 amp
S167 T1- 87 differential
WH1 – over current/over speed

WH2 – negative sequence/over speed
WH3 – over current

Comments: The cause of this disturbance was found to be a failed pot-head from the bus work to the S167 reactor gang-switch, causing S167 52-1 and P130 52-F2 to trip separating the P130 generation from the rest of the grid. At the time of the event WH4 was off line under a permit for hydro testing. WH4, P126 and eventually P125 units were used for the system restoration. A Mayo serviceman was dispatched to S253 to record flags and close S253 52-T1 and S253 52-F1,

Yukon Energy Corporation
System Disturbance Report

Date: Feb 05, 2009

System Operator: Gary McLaughlin

Weather:-26 C

Percentage of Grid: 100%

Pre-Disturbance Generation Setup

WH1	5.32Mw
WH2	3.3Mw
WH4	19.59Mw
AH1	14.3Mw
AH2	15.5Mw

Total Generation: 57.91Mw

Disturbance:

Time	Event
08:54:20	AH1 non lockout trip (stator temp)
08:54:22	S150 52-22 open U/F
08:54:42	AH2 non lockout trip
08:54:45	WH1 tripped
08:54:49	S150 52-21 open U/V
08:54:49	S150 52-17 open U/V
08:54:49	S150 52-18 open U/V
08:54:50	WH4 tripped
08:55:00	Faro 701 tripped
08:56:20	S6837 open
08:56:20	S6838 open
08:56:20	S9815 open
08:59:42	S164 52-3 open

Restoration:

09:01:30	AH1 closed
09:01:44	Faro 503 opened
09:07:18	FD7 on line
09:09:34	WH2 on line

09:11:34	S150 52-17 closed
09:15:49	WH3 on line
09:17:50	S150 52-18 closed
09:19:45	S150 52-21 closed
09:20:59	S164 52-3 closed
09:21:01	S150 52-17 open
09:21:34	S164 52-3 open
09:25:52	WH4 on line
09:26:12	AH2 on line
09:28:30	WH1 on line
09:33:23	S6838 closed
09:35:51	S164 52-3 closed
09:37:04	S6837 closed
09:53:50	S9815 closed
09:54:41	S150 52-22 closed
10:07:04	S150 52-17 closed
10:25:20	Faro 701 closed

Time Variance

Feeder	Opened / Tripped	Closed	Variance hr/min/sec
Faro 701	08:55:00	10:25:20	1:30:20
S164 52-3	08:59:42	09:20:59	0:21:17
S150 52-17	08:54:49	09:13:35	0:18:46
S6838	08:56:20	09:23:33	0:27:13
S6837	08:56:20	09:37:04	0:40:44
S150 52-21	08:54:29	09:19:45	0:25:16
S150 52-18	08:54:49	09:17:50	0:23:01
S150 52-22	08:54:22	09:54:41	1:00:19
S9815	08:56:20	09:53:50	0:57:30

Targets/Flags:
WD7 was taken off line just previous
AH1 tripped off on high stator temp
WH4 tripped off on u/v and over-speed
WH1 tripped off on o/s and o/c
WH2 tripped off on ph o/c and stage

REFERENCE: Page 10 of Overview

PREAMBLE:

YEC states "with ongoing load growth and expressed interest from other future industrial customers, the existing hydro generation is likely to be fully utilized within the next few years, necessitating new renewable supply sources in order to avoid reliance on high cost baseload diesel generation and the resulting GHG emission issues".

QUESTION:

a) Please provide all evidence, assumptions and scenarios that support YEC's position that existing hydro generation is likely to be fully utilized within the next few years and result in a reliance on baseload diesel generation. This evidence should quantify the amount of baseload diesel generation for the applicable time period.

b) Please comment on the impact of the worsening world and Canadian economic situation and outlook on this statement.

ANSWER:

(a)

Please see Yukon Energy's 20 Year Resource Plan and UCG-YEC-1-8(d).

(b)

Please see YECL-YEC-1-20(c).

REFERENCE: **Page 2-19 Line 10**

QUESTION:

a) Please provide details as to why the approved 2005 output from the wind turbines is overstated compared to 2005, 2006, and 2007 actuals.

b) Please provide the 2008 actual wind generation output and rational for the 2009 forecast.

c) Please explain what actions have been taken to increase the output of the wind generations in the test period.

ANSWER:

(a), (b) and **(c)**

See LE-YEC-1-26 in regards to operational and maintenance problems with the wind turbines, and plans for increasing output.

REFERENCE: **Introduction Page 1-7**

PREAMBLE:

Yukon Electrical wishes to better understand the arrangements and cost benefits associated with the addition of Minto Mine and the CSTP expansion.

QUESTION:

a) Please provide a comparison of the forecast to actual costs of the Minto Mine spur line and phase 1 of the CSTP. Please indicate all contributions that were made and identify the source of the contribution.

b) Please provide the business case and regulatory models associated with Phase 2 of the CSTP. Please show the Net Present Value NPV analysis, with and without the addition of the Alexco Mine. Please provide details of the anticipated customer contributions that will be required. Please identify the party(ies) expected to make such contributions and when.

c) In regard to the connection of the two grids, the Mayo Dawson at 69kV and the CSTP at 138kV, what specific equipment is being proposed to transparently allow the grids to synchronize and support each other? Please provide the technical documentation for this equipment.

d) Please provide a copy of the recommendations provided by the Auditor General related to the Mayo Dawson Transmission line. Please detail the manner in which YEC has specifically implemented those recommendations with respect to the CSTP.

e) What is the maximum power (MW) that can be transmitted down the 69 kV line from Mayo toward the Grid tie point?

ANSWER:

(a)

Please see response to LE-YEC-1-46 and LE-YEC-1-47 which provide the detailed cost breakdown of the original budget and the current (not yet finalized) cost budget for both the CSTP Stage 1 and the Minto Spur.

A summary of contributions is provided as response to YECL-YEC-1-30.

(b)

This analysis cannot be provided at this time; it will be prepared at such time as government funding arrangements are finalized.

(c)

The design engineering for CSTP Stage II is not presently underway. Dynamic system studies are required to be able to identify any additional equipment that will be required for system stability. These studies have not been completed and therefore no details of the equipment required are known.

(d)

Please see report provided as Attachment 1 to this response. The recommendations are grouped as follows in the five main areas as described in the Main Points section of the report:

- **Shortcomings in definition of scope and costs:** YEC engaged experienced technical resources early in the process who frequently and in detail reviewed the outputs of design engineers to ensure outputs were reasonable. As well, the Board of Directors was provided frequent, detailed updates on cost, scope and progress.

- **Shortcomings in "design-build" approach:** YEC used traditional construction approach with separate contracts for design engineering, project management and construction.

- **Shortcomings in project management:** YEC hired a professional project manager to track schedules and budgets, monitor progress, report issues and act as liaison between engineers, constructors and YEC. In addition, an external project coordinator was hired to act as an owner's representative and monitor progress of all project construction activities (the individual hired is a former Vice President, Transmission for BC Hydro and advised the Office of the Auditor General as part of the review of the MDTS project).

- **Lack of contracting policies:** Since the MDTS project was completed, YEC conducted a comprehensive contracting policy project. This involved hiring an external consultant to help in the development of policies (see response to PWP/HML-YEC-1-42 for copies of these policies). In addition, YEC legal counsel was directly involved in the preparation of all major construction contracts to ensure proper mitigation of risk.

- **Inadequate financial management and project cost controls:** YEC devoted significant resources to the monitoring of project costs. At the construction approval stage, YEC's Board of Directors required management to commit to reporting back to the Audit Committee on cost and progress every 6 weeks (roughly twice as frequently as normally scheduled). As well, extra resources in financial administration and senior financial management were dedicated to the project to ensure satisfactory results.

(e)

Currently, if the Mayo load is average (1 MW) and the Mayo plant is at its maximum output (4.9 MW), than the maximum power that can be transmitted towards Stewart Crossing is 3.9 MW. The winter Dawson load is approximately this amount.

The transmission line between Mayo and Stewart Crossing is capable of carrying 11 MVA.



Mayo-Dawson City Transmission System Project

February 2005

Office of the Auditor General of Canada
Bureau du vérificateur général du Canada

All the audit work in this Report was conducted in accordance with the standards for assurance engagements set by the Canadian Institute of Chartered Accountants. While the Office adopts these standards as the minimum requirements for our audits, we also draw upon the standards and practices of other disciplines.

This Report is available on our Web site at www.oag-bvg.gc.ca.

Ce document est également disponible en français





Auditor General of Canada
Vérificatrice générale du Canada

To the Honourable Speaker of the Yukon Legislative Assembly:

I have the honour to transmit herewith my report on the Mayo-Dawson City Transmission System Project to the Yukon Legislative Assembly in accordance with the provisions of section 35 of the *Yukon Act*.

Sheila Fraser

Sheila Fraser, FCA
Auditor General of Canada

Vancouver, 7 February 2005

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Mayo-Dawson City Transmission System Project

Main Points

1. The Yukon Energy Corporation recently completed the Mayo-Dawson City transmission system project to provide hydro power to Dawson City customers. The project was essentially justified on the basis of cost savings that would result from replacing diesel-generated power with hydro power. While savings may still be realized, the project was not well managed by the Corporation. This resulted in significant delays, cost overruns, and design and construction work that did not meet the Corporation's intent. In particular, the Board of Directors and management did not ensure that the Corporation established sound policies and practices or provided sufficient oversight and control over the implementation of this project. We identified

- shortcomings in defining the project scope and costs;
- substantial risks in using the chosen construction approach as the Corporation did not have the required experience and expertise;
- weak project management;
- significant deficiencies in contracting for construction and services; and
- inadequate financial management and project cost controls.

2. The Yukon Energy Corporation estimates that the total cost of the project is about $36 million, representing a cost overrun of about $7 million. However, this amount does not take into full account significant claims by the construction contractor and counterclaims by the Corporation that were still unresolved at the time of our audit.

Background and other observations

3. The Yukon Energy Corporation is the primary generator and transmitter of electrical energy in the Yukon. The Corporation serves customers living in and around Dawson City, Mayo, and Faro. It also sells power to another utility, which in turn distributes the energy to other Yukon communities, including Whitehorse.

4. In June 2000, the Corporation's Board of Directors approved the construction of a wood-pole transmission line to be completed before the end of 2002 and designed to transmit hydro power from Mayo to Dawson City, about 223 kilometres away. The scope of the project also included the construction of a new substation and modifications to two existing substations. Until this transmission system became operational in

September 2003, the Corporation supplied its customers in Dawson City (population about 2,000) with electrical energy generated from its local diesel engines. In replacing diesel with hydro power, the Corporation has almost eliminated its use of diesel generation.

5. Like any corporate body, the Corporation is expected to follow good management practices and employ sound project management principles. As a subsidiary of a government corporation, the Corporation operates at arm's length from the Yukon government. It is not subject to the same rules as government departments. However, government corporations and their subsidiaries are still a part of the government program family and subject to the same principles of corporate governance and accountability. This report provides an opportunity for the government to examine and, where necessary, strengthen the governance and accountability of government corporations and their subsidiaries.

Introduction

Yukon Energy Corporation and its operating environment

6. The Yukon Energy Corporation (YEC or the Corporation) is the primary generator and transmitter of electrical energy in the Yukon Territory, which has a population of about 30,000. The YEC is a subsidiary of Yukon Development Corporation, a government corporation owned by the Government of Yukon. The Yukon government appoints the members of the Board of Directors of the Yukon Development Corporation (who are also members of the YEC Board of Directors). The YEC Board of Directors delegates responsibility for the day-to-day business affairs to the President and Chief Executive Officer and to other senior managers. The YEC has about 66 employees.

7. Although the YEC was established in 1987 to take over electrical generation facilities previously owned by the federal government's Northern Canada Power Commission, it was not until 1997 that the YEC decided to operate and manage its own assets and hire its own staff. In its initial 10 years, the YEC contracted with the Yukon Electrical Company Limited—a private, investor-owned utility—to manage and operate all YEC facilities.

8. There are about 15,000 electricity customers in the territory. The Corporation directly serves about 1,700 of these customers—most of them living in and around Dawson City, Mayo, and Faro. Indirectly, the Corporation provides power to many other Yukon communities, including Whitehorse, through the Yukon Electrical Company Limited, which buys power from the Corporation and sells the energy to retail customers in the territory.

9. The Corporation has the capacity to generate 75 megawatts of power from its hydro facilities at Whitehorse (40 megawatts), Aishihik Lake (30 megawatts), and Mayo (5 megawatts). Its diesel generators can generate 39 megawatts. In addition, a small amount comes from wind turbines. As a public utility, its activities are governed by the territorial *Public Utilities Act*, the *Business Corporations Act*, and the *Waters Act*. The operations of the Corporation are also governed by the Yukon Development Corporation Regulation made under the *Yukon Development Corporation Act*. For example, to develop or acquire new transmission lines above a certain voltage, the Corporation is required to obtain approval from its parent corporation and the minister responsible for both the Yukon Development Corporation and the YEC.

10. Under the *Public Utilities Act*, the Yukon Utilities Board, a quasi-judicial board appointed by the Yukon government, is responsible for regulating utilities in the Yukon. The Yukon Utilities Board deals with issues that include rate changes and factors affecting rates, as well as customer service issues. For example, it may conduct a public review of general rate applications from utility companies. The review examines a utility's revenues and its costs of providing electricity, and the findings are used to establish rates. The current electricity rates were set in 1996–97, with several revisions in subsequent years.

The Mayo-Dawson City transmission system project

11. Since 1951, the Corporation's Mayo hydro facility has served customers in central Yukon. The facility originally supplied electricity to a mine and communities in Mayo, Keno City, and neighbouring areas. However, the mine was closed in 1989, leaving a surplus of about three megawatts of hydro power at the Mayo facility for a number of years. In 1991, the Yukon Electrical Company Limited assessed the feasibility of a transmission line to make use of the surplus power. In 1992, the Yukon Utilities Board held a hearing on the capital resource plan of the two companies, but recommended that no further studies on the proposed transmission line be performed unless there was a sufficient change in demand. From 1991 to 1997, electricity sales in Dawson City increased by about 29 percent. It was not until 1998 that the Board of Directors of the Yukon Development Corporation directed the YEC to undertake a full feasibility study of the proposed transmission line.



Workers mount a crossarm on a wood pole, which is used for the transmission line.

12. In June 2000, the YEC Board of Directors approved the construction of a wood-pole transmission line at a projected cost of $27,246,000 (2002 dollars). The project was to be completed before the end of 2002 and would transmit hydro from Mayo to Dawson City, a distance of about 223 kilometres. The transmission line, with a design capacity of 15 megawatts, would serve a population of approximately 2,000 and carry an initial peak electrical load of about 2.8 megawatts. In August 2000, the minister responsible for both the Yukon Development Corporation and the YEC approved the project. The scope of the project included the construction of a new substation at Callison (a subdivision of Dawson City) and modifications to two existing substations, one at Dawson City and another at Mayo. A key objective of the project was the long-term reduction of electrical rates through greater use of the existing hydro station in Mayo to replace expensive diesel generation in Dawson City.

Focus of the audit

13. We undertook this audit at the request of the YEC Board of Directors. We looked at key aspects and activities of the Mayo-Dawson City transmission system project. Our audit focussed on specific areas, including

- feasibility and cost-benefit analysis,
- overall project management,
- contracting practices,
- management of project implementation,
- financial management and project cost controls, and
- adherence to original project specifications.

While this report refers to various contractors, our comments and conclusions about management practices and actions refer only to those of the Yukon Energy Corporation. We did not audit the records of private sector contractors. Consequently, our conclusions cannot and do not pertain to any management practices that contractors followed.

For more information on our audit, see **About the Audit** at the end of the report.

Observations and Recommendations

Feasibility and cost-benefit analysis

Project scope and costs not adequately defined

14. YEC officials regard the Mayo-Dawson City transmission system as the single largest capital project the Corporation has ever undertaken. We found that the Corporation lacked the experience and expertise to carry out a project of this nature and magnitude. In total, it spent about $1.6 million on needs and feasibility analyses and preliminary engineering. While the need for the project and its feasibility and benefits were well justified, we found that the project scope and costs were not adequately defined in the feasibility study and cost estimates.

15. In May 1998, the Board of Directors of the Yukon Development Corporation authorized an amount of $400,000 to support the YEC's completion of a full feasibility study and a plan for the conceptual design, implementation, and financing of the proposed project. The YEC completed the feasibility study, which looked at different electrical options and economic conditions. The study identified an increase in demand for electricity in the Dawson City area, a decrease in interest costs, and an increase in diesel fuel prices. The study estimated that the project would cost $21 million (1998 dollars).

16. In April 1999, the Corporation hired an engineering firm to complete a peer review of the feasibility study. The review indicated that the estimated, overall project costs may have been understated by $2 million to $3 million. In April 2000, the Yukon Government's Department of Economic Development reviewed the economic assumptions and methodology used in the study and found them to be reasonable.

17. In July 1999, the YEC obtained approval from its board of directors to prepare preliminary engineering and to incur costs up to a maximum of $1.65 million, on the understanding that these expenses would become a cost of the project, should it proceed to completion. In late 1999, the Corporation selected an engineering firm to do the preliminary engineering and cost estimates.

18. In the spring of 2000, the engineering firm came up with an estimated cost of about $25.5 million (2000 dollars) for the project—$23 million for construction and $2.5 million for internal costs. On 27 June 2000, the YEC Board of Directors approved the construction of the project at $27,246,000 (2002 dollars)—$23,175,000 for construction, $1,825,000 for internal costs, and $2,246,000 for interest during construction and an inflation allowance.

19. According to the information submitted to the Board, the estimated $1,825,000 for internal costs would include a wide range of items such as

- project management,
- staff costs,
- tender preparation,

- evaluation and selection of contractors,
- costs for permits,
- financial and contract administration,
- accounting and reporting, and
- a legal survey.

The estimates appear to have been understated, given that the Corporation had already been authorized to spend up to $1.65 million to perform a feasibility study and initial design work. Nor did the estimate clearly identify as potential project costs other items such as legal and insurance costs during the construction phase.

20. A point-form project summary proposal was presented to the responsible minister in July 2000. It showed that the project was expected to save about $14 million over the life of the project (40 years) compared with the continued use of diesel. The project was also expected to generate about $4.5 million in employment opportunities for First Nations and local businesses. It would also reduce diesel emissions.

21. The YEC's analysis of cost savings showed that the present value of the costs associated with the continued use of diesel over 40 years was an estimated $42,184,000. In comparison, the Corporation estimated the present value of the costs of the transmission system over the same period at $27,964,000. Replacing diesel-generated power with hydro power would produce a net savings of about $14 million.

22. In this analysis, the YEC assumed the net capital cost for the project to be about $23 million instead of the estimated total of $27.246 million. This was done because its parent corporation (the Yukon Development Corporation) would provide $4 million in contributions. We believe that it would have been appropriate to consider the full cost in the analysis. We noted that the cost analysis did not include the capital costs needed to keep the diesel plant available as a standby operation. The YEC explained that this cost was not included in the project scope or budget because it was expected to be very modest. In the end, it amounted to about $285,000.

23. In June 2000, the YEC Board of Directors also requested the Yukon Development Corporation to provide a repayable contribution of up to $900,000 for the installation of a rural electrification infrastructure. In February 2001, the YEC Board of Directors authorized additional funding of up to $500,000 for conductor upgrades, subject to receiving a non-repayable contribution from its parent corporation. The Corporation subsequently received these contributions. With the $400,000 originally approved by the Yukon Development Corporation for a feasibility study and $27,246,000 for construction, the authorized costs associated with the project totalled $29,046,000.

24. In August 2003, the President of the Corporation at the time advised the YEC's Board of Directors that the break-even point for the project was about $40 million. However, we could not find any analysis to support this assertion. The Corporation provided us with data showing that projected over 40 years,

the estimated present value of revenues from the Dawson City area is about $44.6 million. The present value of operating costs of the transmission system projected over the same period is about $6.4 million. Our analysis suggests that the investment in this project could be justified if the capital costs did not exceed $38.2 million.

25. In summary, it appears that estimates of project costs were understated. In particular, potential internal costs were not clearly identified and budgeted for. Capital costs of keeping the diesel plant available as a standby operation were not included in the estimate. As we explain later in the report, many other changes were made to the scope of the project during the construction. It is important that the Corporation define the scope and identify the costs of capital projects adequately in seeking approval for projects.

26. **Recommendation.** To avoid underestimating total project costs, the Yukon Energy Corporation should ensure that the scope and costs of capital projects are adequately defined and identified when seeking project approval.

Management's response. The Corporation has recently improved its capital project processes. An interdepartmental Project Review Committee now reviews all capital project plans and makes recommendations to the board of directors for approval. Projects, especially larger ones, have detailed descriptions of scope and forecasted costs.

Substantial risks using the "design-build" approach

27. The proposal to the YEC Board of Directors in June 2000 suggested a single contract to construct the project using the "engineer, procure, construct, and manage" approach. The proposal also indicated that management planned to proceed with a small project management team that would include a term employee or contractor who would act as the project manager. The YEC selected this approach in the belief that it would reduce the time needed to complete the project and minimize the need for in-house staff involvement. However, it does not appear that the board of directors was fully briefed about the risks associated with using the "engineer, procure, construct, and manage" approach, later called the "design-build" approach.

28. In a June 2000 summary report, the engineering firm hired to do preliminary engineering and cost estimates identified three possible approaches to project delivery:

- design-build (turnkey);
- design, supply, and installation; and
- construction management.

29. The engineering firm cited many disadvantages and few advantages to using the design-build method for this project (Exhibit 1). For example, a disadvantage of the design-build method is that project risk is assigned to only one contractor. The engineering firm recommended that the project be delivered using the construction management approach, in which the detailed design is completed before contracts are issued, and the Corporation has direct control over the project schedule. However, despite the advice of

Exhibit 1 Key points in the engineering firm's analysis of advantages and disadvantages to using the design-build approach for the Mayo-Dawson City transmission system project

Advantages	Disadvantages
• Firm commitment to cost, time, and scope of construction • Single contract for the Corporation • Minimal need for YEC resources • No need for detailed technical input from the Corporation because the system is defined by a performance contract	• Design-build contractor not a local company • Total project scope not known (which can lead to cost overruns) • Limited opportunity to package work for small local contractors • Limited owner involvement once design-build contract is awarded • Project risk assigned to one contractor who must incorporate it in the tender price • Limited opportunity for First Nations involvement • Loss of design-build advantage because designer and constructor are not located together in the same area • Potential for conflict of interest, since designer and builder are from one company • Project bonding requirements will exclude medium-sized, but very capable contractors from participating • Large contractors could bring affiliated labourers, increasing overall cost

Source: Yukon Energy Corporation (based on a report prepared by the engineering firm hired by the Corporation)

the engineering firm, the Corporation's management recommended that the Board of Directors approve the design-build approach.

30. In this case, the YEC may have expected to benefit from the advantages of the design-build approach. However, it appears to have underestimated the associated risks as it lacked experience in using this approach. As we explain later in the report, the Corporation engaged more resources to manage the project than would normally be expected for a properly executed project.

Project not subject to a comprehensive review prior to implementation

31. Under the *Public Utilities Act*, the Commissioner in Executive Council may, by order, designate an energy project as a regulated project when the project is considered to be significant. An energy project includes any plant, smelter, refinery, or other undertaking or facility designed to use, convert, or process an energy resource. If an organization intends to construct a regulated project, it must apply to the appropriate minister for an energy project

certificate. The minister will then refer the application to the Yukon Utilities Board for a review.

32. When the minister responsible for the Yukon Development Corporation and the YEC approved the Mayo-Dawson City transmission system project in August 2000, the Yukon Development Corporation advised the minister that a transmission line did not qualify as an energy project as defined in the legislation. It also indicated that the YEC considered the risk of a problematic decision or an intervention by the Yukon Utilities Board to be low and manageable. As a result, the minister did not refer the project to the Yukon Utilities Board for review at that time. In January 2001, the Yukon Utilities Board indicated that it agreed with the YEC that there was no legal requirement for the board to approve the construction of the project or assess the prudence of any expenditure until such time as the Corporation sought to recover the costs of the project.

33. While there was no requirement for a review by the Yukon Utilities Board, such reviews are mandatory for capital projects in some other jurisdictions such as the Northwest Territories and British Columbia. They provide an independent assessment and critique of a proposed project, which can lead to improvements in the project. Such a review would have provided the Corporation with some assurance that the regulator would not raise major objections to the project after it had been completed—if it were carried out as approved.

34. In view of the significant expenditures and risks involved in major capital projects, we believe that it would be prudent for the YEC to request that the responsible minister seek an order to designate future projects of this nature and magnitude as regulated projects. This would provide for a review by the Yukon Utilities Board and, if necessary, a public hearing before the project can be implemented. The Corporation has advised us that if the projected cost of a capital project exceeds a specified threshold, it will voluntarily submit the project to the Yukon Utilities Board for review before the project proceeds.

35. **Recommendation.** The Yukon Energy Corporation should request that the responsible minister seek an order from the Commissioner of the Executive Council to designate future major capital projects as regulated projects, in accordance with the *Public Utilities Act*, so that such projects are reviewed by the Yukon Utilities Board and public hearings are held, if necessary, before the projects proceed. The minister may wish to consider proposing legislative amendments to require that all major capital projects be reviewed by the Yukon Utilities Board prior to approval.

Management's response. The Corporation is proposing to establish a process that would require projects greater than $3 million to receive prior approval by the Yukon Utilities Board.

Overall project management

Lack of established project management policy and procedures

36. We expected to find a project management policy that established consistent standards for the designation, authorization, financial control, and

conduct of capital projects. However, the Corporation does not have a project management policy, and so it lacked clear standards and procedures to implement this transmission system project. It is important that the board of directors and management establish sound policies and practices and provide oversight and control over the management and operations of the Corporation.

Roles, responsibilities, and accountability not clearly defined

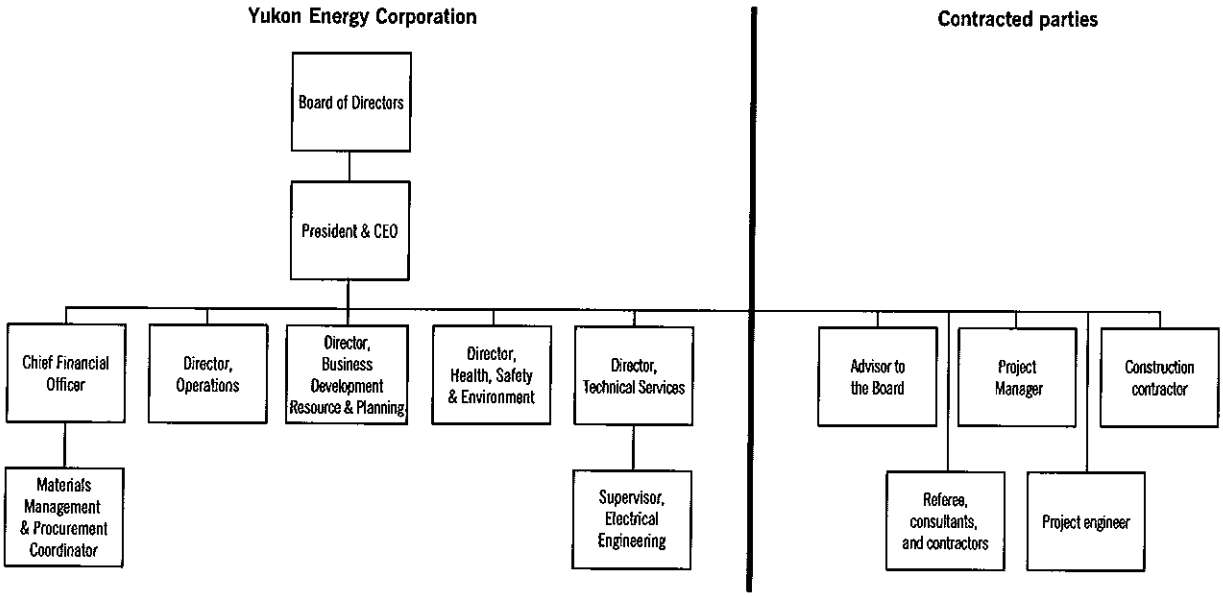
37. We expected to find a project brief with a statement of objectives that clearly defined roles, responsibilities, accountability, implementation approach, detailed budgets, and controls for this capital project. However, we did not find such a document. Instead, there were bits and pieces of information about the project management team and about lines of communication. The Corporation also referred to the responsibilities described in the construction and project manager contracts, but we found the descriptions to be inadequate.

38. We expected that there would be an initiator, a sponsor, and a project manager for a capital project. In a well-managed project, the project initiator—a manager at a senior level—is accountable for the success of the project and for ensuring that all necessary project management procedures, financial controls, and reporting requirements are in place. A project sponsor—also a manager at a senior level—is designated to support the success of the project by providing liaison with the board of directors or the senior management committee. A project manager is responsible for completing the objectives of the project.

39. It was not clear who was the initiator of the transmission system project. We found a continual change of leadership for the project between 1999 and 2004. The corporation president, who was there when the project was approved, left in September 2000. His replacement resigned in May 2001, soon after the award of the construction contract. The chief financial officer was made the next president, but he resigned in December 2003.

40. No sponsor was designated for the project. The president or the advisor to the board made progress reports to the Corporation's Board of Directors. From the beginning of the project, the Director, Technical Services (one of several key support staff to the president) was involved as a member of the project management team, which comprised several consultants and in-house staff. He prepared budgets and performed variance analysis from time to time, and he became actively involved in the project when problems arose. However, we could not find a clear description of his role. He retired in August 2003, but the Corporation retained him on contract immediately afterward to provide technical support services and to assist in resolving outstanding issues. We noted that the Corporation does not have established rules to govern post-employment contracts. The Corporation indicated that it needed to retain the services of this particular individual because his detailed knowledge of the project was critical to completing it. (Exhibit 2 shows the key players in the project.)

Exhibit 2 Key players in the Mayo-Dawson City transmission system project



41. The project manager (also referred to as the "consultant" under the construction contract called the design-build agreement) was hired on contract by the Corporation. However, it was not clear who the project manager reported to. The Corporation told us that he reported to the president during most of the project. We believe that, to successfully manage a project, a project manager must be seen to have a clear understanding of his/her role and authority. The construction contractor indicated that the project manager did not understand his role and authorities. Moreover, the project manager was not available on a full-time basis after April 2003, due to medical reasons. Although the firm acting as the project engineer provided support in the project manager's absence, the construction contractor did not view the engineering firm as the project manager.

42. **Recommendation.** The Yukon Energy Corporation should develop a project management policy to establish standards and procedures for the designation, authorization, financial control, and conduct of capital projects. In implementing capital projects, it should prepare a project brief that includes a statement of objectives and clearly defines roles, responsibilities, accountability, implementation approach, detailed budgets, and controls.

Management's response. The Corporation will undertake an audit of project management practices and procedures later in 2005. Upon completion of this review, a project management policy will be prepared. Where necessary, training will be provided to project managers. With respect to project briefs, expanded project descriptions are now prepared and reviewed by the newly implemented Project Review Committee.

Contracting practices

Lack of contracting policy and clear contracting procedures

43. The Corporation is not required to follow the general administrative policy directives issued by the Yukon Government when it contracts for construction and services. When its board of directors approved the project in 2000, the YEC only had a set of interim procurement guidelines in place. It drafted contracting guidelines in January 2002, but these guidelines had not been finalized when the project was implemented. As a result, there was no established contracting policy and no clear contracting procedures for YEC staff to follow. Specifically, we found that there were no established financial limits or thresholds above which contracts had to be awarded on a competitive basis.

44. Although the YEC did issue a request for proposals in a few cases, for this project we found that it awarded 12 contracts (each with payments over $50,000) on a sole-source basis. We found no explanation in the Corporation's files to justify this approach. The lack of a competitive process diminishes opportunities to identify the best contractor or get the best possible price for quality services. We are particularly concerned about certain contracts and payments discussed in the following sections of this report.

Significant deficiencies in contracting for construction and services

45. **Construction contract.** In October 2000, the YEC applied a set of criteria it developed to pre-qualify six firms to bid for the construction of the project. We found that the criteria were not specifically tailored to the requirements of a design-build project. Furthermore, we could not determine whether the values assigned to certain criteria were reasonable or appropriate and whether the Corporation had obtained sufficient information on the firms to make an informed decision.

46. Though in tendering the construction contract the YEC issued a request for proposals on 24 November 2000, it was not until about a month later that it sent out the design-build agreement, a key component of the proposal package. The invited firms raised many questions seeking clarification of the proposed work and, at their request, the closing date for the bids was extended from 23 January 2001 to 6 February 2001. The Corporation received three bids, but disqualified two of them for failing to comply with the mandatory requirements of the request for proposals. According to the Corporation, one disqualified firm failed to provide the required security and insurance information and to submit the exact proposal form; the other disqualified firm added conditions or qualifications to its proposal. As a result, there was only one valid bid. The YEC opted to negotiate with the firm rather than re-tender the contract. The selected firm (Chant Construction Company Inc.) was ranked lower than several other companies that had been evaluated at the pre-qualification stage.

47. At a meeting with the selected firm in February 2001, Corporation representatives identified a number of concerns about the firm's proposal. For example, they noted that it lacked several items in the scope of work set out in the proposal. They noted that the proposal had no procurement plan and

no formal safety program. In addition, some unit prices in the proposal were not consistent with the scope of the work.

48. During the construction contract negotiations in March 2001, the Corporation also became aware that the firm lacked experience in energy transmission and substation construction. For this project, the firm planned to rely on a series of individual specialists who were widely distributed throughout central Canada. It does not appear that the Corporation appropriately considered re-tendering the contract once these concerns came to light. It signed the construction contract (design-build agreement) on 11 April 2001, at a negotiated fixed price of $22,070,790.

49. Contracts for the project manager and project engineer. When the board of directors approved the project, the Corporation indicated that it would engage a contractor to act as project manager. The Corporation subsequently established an amount of $800,000 as the forecast cost of project management. It awarded a sole-source contract to one firm to act as project manager and another sole-source contract to another firm to act as the project engineer. The Corporation treated project engineering services as part of internal project management costs. By the time the project was completed, the Corporation had paid over $2.3 million in total to these two firms. It indicated to us that the project required a far higher level of project management support than had been expected. We identified significant deficiencies in these contracts—in particular, a lack of safeguards to protect the interests of the Corporation.

50. The project manager contract was not awarded on a competitive basis. In July 2000, the Corporation identified the project manager through a local human resources company, from a list of seven potential candidates. Only one candidate (Ian Hayward, principal of a firm called Windrush Engineering) was available and interested in the project. However, the Corporation did not look elsewhere for additional candidates. Initially, it contracted with the firm to provide consulting services relating to the invitation and selection of contractors for the construction of the transmission system project. The consulting work was scheduled to be from August to October 2000 and for a maximum of $30,000 (plus GST). The contract price was later increased to $70,190 for additional work, and the completion date was extended to 31 May 2001.

51. In September 2001, the Corporation entered into a project management contract with the same firm; the contract was retroactive to 1 June 2001. The Corporation would pay the project manager based on actual hours incurred in 2001 and 2002 (the project manager was expected to work an average of 150 hours per month), plus reimbursable expenses. We found that the contract did not specify a maximum price or ceiling and did not contain any provision for auditing claims.

52. Under the initial contract for consulting services and the subsequent contract with the same firm for project management, invoices submitted by the project manager show that the YEC paid a total of $424,455. Each invoice claimed a number of hours, but we did not find any detailed time

sheets submitted with the claims. We also noted that the Corporation reimbursed the project manager about $6,000 for entertainment expenses (on meals and alcoholic beverages with executives of the construction contractor and project engineering firm and with YEC staff and consultants) that were not provided for in the contract.

53. The contract with the firm acting as project engineer was also awarded without competition. It appears that no attempt was made to get competitive bids for this contract, and we found no explanation in the Corporation's files to justify this approach. We found no evidence that the board of directors approved a contract for engineering services on this project. We also noted that the project manager (Ian Hayward) was the founder of the engineering firm (Ian Hayward International Ltd.) and a director of this firm until 1995. The YEC knew of this relationship and issued the two sole-source contracts without raising any questions about it.

54. While the Corporation treated project engineering services as part of internal project management costs, using this engineering firm was contrary to the design-build concept as proposed by management—to employ a small project management team with only one contractor acting as project manager. According to the contract, under the direction of the project manager, the engineering firm's field office staff (one resident engineer and assistant, four field inspectors, and one field office manager) and staff at its head office and other locations (a resident engineer and assistant, field inspectors, principals, senior and junior engineers, draftsperson, technician, and secretary) would provide engineering services. The Yukon Energy Corporation would pay the project engineering fees, based on time spent, and reimbursable expenses. The agreement did not specify a maximum price or contain provisions for the Corporation to audit the claims if necessary. The agreement took effect on 3 May 2001, although the two parties did not sign it until September 2001. We found that the firm submitted an invoice for about $10,000 for services performed in April 2001, which indicates that it had begun work before the effective date of the contract. In our view, entering into contracts retroactively and allowing work to be performed before contracting arrangements have been completed is not an acceptable practice.

55. The contract was signed on behalf of the Director, Technical Services, by a Corporation employee at a supervisor level who did not have the authority to enter into the contract. This employee was not an officer of the Corporation. The Corporation's signing authority guidelines require one director (of the board of directors) and one officer of the Corporation to sign together to initiate expenditures of more than $500,000 for operations and maintenance (and for capital expenditures of more than $1,000,000), with the prior approval of the board of directors. At 31 May 2004, the Corporation had paid nearly $1.9 million to the engineering firm. The expenditures on this contract alone thus exceeded by far the $800,000 that the Corporation had budgeted for internal project management costs.

56. The YEC did not require the project engineer to submit any detailed time sheets to support the hours claimed, except for August 2001. For that month, concerned about the amount of time claimed for principals of the firm, the Corporation asked for a breakdown of the hours they had worked and on what matters. We also noted that in May 2002, the project manager wrote to the Corporation about the invoice submitted by the project engineer for April 2002. The project manager stated that he could support all charges except the charge for the principals' time ($10,290). He indicated that he had no yardstick by which to measure their input, other than a time sheet. Nonetheless, the project manager recommended that the claim be paid, and the Corporation paid the invoice without questioning it further. Corporation officials told us that the project engineer also provided information on the charges for two other invoices (October and December 2003) as requested by the Corporation.

57. Other contracts. We identified a number of deficiencies in other contracts related to this project. For example, in several contracts the Corporation paid the contractors more than the specified maximum contract price without having prepared formal contract amendments. In one other case, there was no written contract for goods and services involving payments of about $136,595. This was made solely on the basis of invoices submitted by the contractor.

58. In summary, we identified significant deficiencies in contracting for construction and services. The Corporation had no established contracting policy and no clear contracting procedures to provide for transparency and competition and ensure best value. It awarded many contracts on a non-competitive basis. We found that the contract for project engineering services was not properly planned for and authorized. In addition, the contracts for the project manager and project engineering services did not include adequate safeguards to protect the interests of the Corporation.

59. Recommendation. The Yukon Energy Corporation should establish and follow a contracting policy and clear contracting procedures that provide for transparency and competition and ensure best value. It should ensure that

- contracting requirements are properly planned for;
- contracts are entered into only by those who have the authority to do so;
- contracts clearly specify deliverables, maximum price, and cost ceilings;
- contracts include provisions for auditing claims, where appropriate; and
- payments are made only within authorized limits.

Management's response. The Corporation had its contracting and purchasing practices reviewed by a consultant in 2004. As a result, new contracting policies and guidelines have been developed and approved by the board of directors, which will address the points raised.

Management of project implementation

Numerous problems encountered during project implementation

60. Many problems arose during the implementation of the project. These included

- trespassing on First Nations lands,
- rerouting around the Dawson City Airport,
- disagreement over the survey data and soil conditions,
- timber removal,
- vibration problems with the transmission line, and
- unsatisfactory design documents and drawings.

As well, there were numerous disputes between the Corporation and the construction contractor. The Corporation alleged that the contractor failed to comply with certain contractual obligations, while the contractor alleged interference by the Corporation and the project manager. Some of these problems could not have been anticipated during the planning phase, but a number of them can be attributed to the Corporation's poor planning, communication, and project management. These problems resulted in additional costs, unresolved disputes between the Corporation and the construction contractor, and delays in completing the project.

61. **Violation of land use permit and trespassing on First Nations land.** The Corporation alleged that the construction contractor failed to get prior approval for temporary access to lands in the Mayo district and violated the land use permit. The Corporation also believed that the construction contractor did not apply responsible route planning practices, resulting in the trespassing on First Nations lands. Indeed, the YEC acknowledged that the contractor had cleared a parcel of First Nations land without proper authorization, and the First Nations concerned requested compensation for damages to their land. The construction contractor told us that it expected that the YEC would have obtained all necessary easements and rights-of-way as required under the contract. At the time of our audit, the Corporation was seeking an indemnification of about $119,000 from the construction contractor for the costs incurred as a result of trespassing.

62. **Rerouting around the Dawson City Airport.** The Corporation indicated that in the early planning stages (for example, during the feasibility study), it was not aware of any expansion plans at the Dawson City Airport. Shortly after design work had begun, the Corporation realized that airport expansion plans were underway and there were provisional zoning regulations introduced for the airport. This would require the rerouting of the transmission line around the Dawson City Airport. In August 2001, the Corporation considered several alternative routes and selected the Australian Mountain/Hunker Creek route to replace the original route. Based on a cost analysis prepared by the construction contractor, the Corporation estimated that the route change would cost about $600,000. In November 2001, the Corporation asked the construction contractor to price a change order for the route change. The contractor responded in May 2002 with a request for a change order of about $1.2 million, but the Corporation rejected the

contractor's estimates. By then, a substantial amount of work was already in progress. The construction contractor indicated to us that it proceeded with this change in the scope of work without insisting that all of the costs be identified and pre-approved in order to preserve the project schedule. The Corporation paid the contractor about $650,000, but it did not issue a formal change order; it felt that it would be difficult and time-consuming to assess a payment for work that had already been completed. The Corporation decided that claims by both parties would be assessed as a package after commissioning of the project. In October 2003, the contractor submitted two claims totalling about $1 million for rerouting work, in addition to the $650,000 already paid. At the time of our audit, the Corporation was disputing the two claims.



Soil conditions can affect the installation of wood poles.

63. **Survey data and soil conditions.** When the Corporation met with the construction contractor in February 2001 to negotiate the construction contract, its officials noted that the contractor's proposal did not make use of the remote survey information included in the request for proposals. The Corporation believes that this was largely because of the contractor's lack of knowledge of this type of information. Later, the project manager also indicated that, in his opinion, the construction contractor did not understand how to use the survey data. The contractor, however, claimed that the survey data were not as accurate as the request for proposals had indicated; it had therefore had to obtain the information by other means in order to complete the detailed design of the transmission line. The contractor also claimed that on-site conditions differed from the soil reports included in the request for proposal.

64. In October 2003, the contractor submitted a claim of $750,000 for costs related to inaccuracies in the survey data, and another claim of $612,630 for additional costs related to unforeseen soil conditions that affected the installation of the wood transmission poles. The Corporation is disputing these claims.

65. **Timber removal.** In March 2000, the Corporation entered into an agreement with two First Nations giving them the first right to take possession, at their own cost, of salvageable timber cut as part of this project, although they were not obliged to do so. Under the agreement, the timber had to be removed within two years after it was cut.

66. In the planning phase of the project, the Corporation did not anticipate any significant costs for timber removal and salvaging. As a result, the removal of cut timber was not included in the design-build agreement. During the construction phase, however, the Corporation had to pay about $400,000 to the contractor and the contractor's subcontractor to have timber removed to locations specified by the two First Nations. It did so to ensure that the project met the terms of the timber removal permit, which required it to clear the timber by 31 March 2002, and because the two First Nations were not satisfied with the amount of salvageable timber left for them. The Corporation claimed that the clearing methods used by the contractor's subcontractor had destroyed a lot of timber. The construction contractor, however, believes that its clearing methods were adequate and effective.



Workers install the transmission line.

67. **Line vibration problems.** After an earthquake on 3 November 2002, the Corporation investigated and analyzed vibration problems associated with the tension of the transmission line. The Corporation alleged that the line tensions are too high, leaving the transmission line susceptible to vibration under certain conditions and the possibility of premature failures. The Corporation believes that it is the construction contractor's responsibility to install dampers on the line to mitigate the effects of vibration. In October 2003, the Corporation submitted a claim of about $1 million for this alleged deficiency, which the contractor is disputing. The contractor believes that the tension of the transmission line met project specifications.

68. **Relationship between the Corporation and the construction contractor.** In April 2002, the Corporation's Advisor to the Board of Directors reported that the most serious issue at that time was the relationship between the Corporation and the construction contractor. Fundamental to this issue was a letter of March 2002 from the Corporation to the contractor's bonding company, in which the Corporation expressed concerns about how the contractor was performing relative to the contract. The contractor took exception to the Corporation's opinion and requested that the letter be withdrawn, but the Corporation refused. In October 2003, the contractor submitted a claim to the Corporation for $6 million, indicating that because of the Corporation's alleged misrepresentation to the bonding company, it had been unable to bid on several projects that would otherwise have been available to it.

69. In addition, the contractor submitted two claims to the Corporation totalling $1.65 million, alleging that the Corporation and the project manager had interfered with the means, methods, and scheduling of work by the contractor and subcontractors. At the same time, the Corporation submitted claims to the contractor totalling about $5.8 million for a late-completion penalty, costs resulting from late completion, and extra project management costs. All of these claims were unresolved at the time of our audit.

70. **Design and drawings.** Under the design-build agreement, the construction contractor was required to prepare and provide detailed construction documents to the Corporation for approval before beginning construction work at the substations. These documents were to include design drawings and specifications setting out all the requirements necessary for the proper construction of the transmission system project. But the Corporation had difficulty obtaining satisfactory design documents and drawings from the construction contractor. The construction contractor told us that a significant difference of opinion existed between the two parties as to the requisite standard to be met.

71. In some cases, the contractor asked that it be allowed to start construction before it had completed the designs and drawings. The Corporation told us it had agreed to these requests in the interest of trying to move the project forward. For example, in August 2002 it allowed civil construction work at the substations to proceed although the overall design drawings had not been completed and approved. The installation of

substation equipment followed, before concerns about the design drawings had been fully addressed. Later, having identified a number of problems, Corporation staff became concerned that the drawings being used on the work site were not accurate. When the Corporation found that there had been virtually no advancement in the drawings, it decided in early February 2003 to suspend work because of safety concerns and problems seen in the field. Meanwhile, there was no complete, detailed plan for commissioning the transmission system.

72. It took several months for the two parties to resolve the impasse over the adequacy of drawings and commissioning plans, deficiencies in construction, and other issues. In May 2003, they agreed to establish an action plan for completing the project. They also appointed an impartial referee to resolve disputes between them. On 27 May 2003, the minister responsible for both the Yukon Energy Corporation and its parent, the Yukon Development Corporation, appointed a new Chair to the Board of Directors of the Yukon Development Corporation (who also became the Chair of the YEC Board of Directors). A primary function of the new Chair was to resolve the issues surrounding the transmission system project.

73. While the original target date for project completion was 1 November 2002, the transmission system was only commissioned on 5 September 2003, which was set by the referee and agreed to by the parties. As of that date, the project achieved a substantial completion status (work was 95 percent complete) although drawings were still incomplete, and there appeared to be a number of deficiencies that remained outstanding. For example, there were issues related to improper cable terminations, inadequate building ventilation, and minor non-completed items. In January 2004, the Corporation accepted delivery of the "as built" drawings as they existed on 23 December 2003. In doing so, it agreed that the construction contractor would be deemed to have satisfied the contractual obligations with respect to the delivery of drawings.

74. In summary, we identified numerous problems during the implementation of the project. Many of them are due to the Corporation's poor planning, communication, and project management. They have resulted in additional costs, unresolved disputes between the Corporation and the construction contractor, and delays in completing the project. The construction contractor acknowledges that it bears responsibility for some of the problems encountered on the project. For example, it executed the design-build agreement without insisting on major changes to the contract knowing that there were problems with the contract documents. It believes that the design-build agreement was incoherent and did not properly articulate the expectations or responsibilities of the two parties under a conventional design-build protocol.

75. Recommendation. In implementing capital projects, the Yukon Energy Corporation should

- apply good project management practices,
- ensure compliance with contract provisions,

- issue formal change orders where necessary,
- ensure that work does not proceed unless authorized, and
- monitor work, so that when problems arise, appropriate action can be taken on a timely basis.

Management's response. The practices identified by the Office of the Auditor General are being addressed. While the deviations from the "best practices" listed are generally unique to the Mayo-Dawson project, management will ensure that the recommendations are applied to all future projects, regardless of size and complexity.

Significant claims in dispute despite agreement that project was complete

76. The design-build agreement contains dispute resolution clauses including the use of negotiation, mediation, and arbitration (with specified time limits outlined). However, we found that neither party relied on these provisions.

77. As noted already, construction work was suspended in February 2003. It was not until May 2003 that the two parties entered into a supplemental agreement in order to complete the project. As part of this agreement, they appointed the referee to resolve disputes between them. Under the design-build agreement, the two parties were expected to make all reasonable efforts to resolve disputes through negotiations. The resolution of a number of issues with the help of the referee led to the project's completion, but many claims remain unresolved.

78. On 2 October 2003, the referee directed both parties to submit their final list of claims by 15 October 2003. The construction contractor submitted a total of about $17 million in claims for numerous issues. The Corporation submitted a claim of $9.5 million for extra project management costs, delays in completion, and other issues. We make no comment on the merits of either of these claims.

79. On 16 January 2004, the two parties entered into an agreement that the project was complete and settled a number of issues. The referee's work also ended that month. At the time of our audit, there was no agreement between the two parties on how and when to settle the final claims. They did not use the provision in the design-build agreement that either party may refer a dispute to arbitration for final resolution.

80. We noted that the Corporation has incurred a significant amount of time, effort, and money engaging lawyers and consultants to assist in resolving the outstanding claims. While the Corporation has made efforts to move the claims process along, it has not had much success. Whatever the outcome, it is important that additional costs incurred by the Corporation are properly accounted for as part of the project costs.

81. Recommendation. In implementing capital projects, the Yukon Energy Corporation should make use of dispute resolution provisions in contracts and agreements to resolve disputes with contractors in an efficient and timely way.

Management's response. Management will use dispute resolution provisions where it is appropriate and in the best interests of the Corporation.

Financial management and project cost controls

Inadequate financial management and project cost controls

82. When undertaking a project similar in size and nature to the transmission system, we would expect an organization to have adequate financial management and project cost controls to ensure that the scope and costs of a project remain within budget and that all change orders and cost overruns are properly authorized. In this project, however, we identified shortcomings in these areas.

83. The Corporation's staff had difficulty reconciling the detailed budgets and variance analyses to the original cost estimates approved by the Boards of Directors of the Corporation and its parent corporation. While the YEC set up several codes in its financial accounting system to record the costs incurred on this project, we found them inadequate for monitoring and reporting project costs against budgets. In 2004, it took the Corporation several months to complete a reconciliation of the actual project costs with the original estimates and approved costs.

84. We found that internal costs were not properly controlled. According to the Corporation's data, expenditures on internal costs of this project totalled about $8.3 million although the original budget was estimated at $1,825,000 (Exhibit 3). These costs included such items as the feasibility analysis, tender preparation, internal project management, staff and travel costs, overhead costs, insurance and legal costs, consultants' and contractors' fees, and other related expenditures. For example, project management costs amounted to about $2.6 million, whereas the Corporation had budgeted $800,000; and staff and travel costs amounted to $1.1 million against the budget estimate of $50,000. The Corporation indicated that because of the numerous problems encountered during the project construction and commissioning, the project required a far higher level of staff involvement than expected.

85. Under the construction contract, the Corporation could make changes in the construction work through a change order or a change directive. A change order is a written order signed by the YEC and acknowledged by the construction contractor to authorize an addition, deletion, or revision in the scope of work or a change in project schedule or price.

86. A change directive is a written order signed by the YEC to direct an addition, deletion, or revision in the scope of work before the two parties agree on the adjustment to the contract. A change order would be recorded once both parties agreed on the contract adjustment.

87. We expected that change orders would have been formally issued for all changes in the work on which the Corporation and the construction contractor had initially agreed. The design-build agreement originally set a fixed price of $22,070,790. Subsequently, the Corporation approved nine change orders with payments amounting to about $1.3 million. However, as mentioned in paragraph 62, the Corporation paid the contractor a total of $650,000 without a formal change order. Moreover, several change orders

Exhibit 3 Summary of Yukon Energy Corporation's internal costs for the transmission system project ($ thousands)

	Original budget	Adjusted budget	Expenditures (31 May 2004)
Project management	150.0	800.0	2,567.0
Feasibility, tender preparation, licence, permits, etc.	1,525.0	1,737.5	1,649.0
Corporation staff costs	100.0	50.0	1,146.0
Legal	0.0	0.0	911.0
Contractors	0.0	0.0	818.0
Consultants	0.0	25.0	347.0
Insurance	0.0	0.0	344.0
Overhead	50.0	50.0	226.0
Materials	0.0	50.0	196.0
Other	0.0	0.0	75.0
Total	**1,825.0**	**2,712.5**	**8,279.0**

Source: Yukon Energy Corporation

were still in dispute after the project had been completed; the contractor is seeking an additional $1.1 million.

88. We noted that the Corporation paid $273,683 to the construction contractor for work performed pursuant to change directives, but no formal change orders for that work were ever made. An additional $780,371 claimed by the construction contractor for work performed pursuant to change directives was in dispute at the time of our audit.

Significant cost overruns incurred

89. We noted that the Corporation's Board of Directors received regular reports on the progress of the project, mostly through the president or the advisor to the board. Management identified potential cost overruns as early as March 2002. However, there were no controls or established procedures to authorize cost overruns and approve payments above the authorized limits for this project. There was no evidence that management ever asked the board of directors to approve any cost overruns and it never formally approved any.

90. At 31 May 2004, the Corporation had spent about $33.5 million on this project (Exhibit 4). This exceeded the authorized total costs by about $4.5 million, mainly due to scope changes (various change orders and directives), unforeseen construction contingencies (for example, earthquake investigation, trespassing on First Nations lands, and a referee to resolve contract disputes), extra project management costs, and underestimated and unbudgeted costs (for example, staff support, legal, insurance, and timber removal).

Exhibit 4 Mayo-Dawson City transmission system project—Authorized costs compared with expenditures ($ thousands)

	Authorized costs	Adjusted budget*	Expenditures (31 May 2004)
Feasibility study	400.0	0.0	0.0
Construction	23,175.0	23,865.5	23,676.0
Internal costs**	1,825.0	2,712.5	8,279.0
Interest and inflation	2,246.0	2,246.0	1,575.0
Additional items (rural electrification and conductor upgrade)	1,400.0	222.0	0.0
Total	**29,046.0**	**29,046.0**	**33,530.0**

*Adjusted budget reflects reallocations of money between categories.

**Internal costs included such items as the feasibility analysis, tender preparation, project management, staff and travel costs, overhead costs, insurance and legal costs, consultants' and contractors' fees, and other related expenditures.

Source: Yukon Energy Corporation

91. In November 2003, the Corporation indicated that the total cost of the project would be about $36.2 million, representing a cost overrun of about $7 million. However, this does not take into full account all the claims submitted by the construction contractor and counterclaims by the Corporation that were still in dispute at the time of our audit. As we indicated earlier in this report, the investment in this project could be justified if the capital costs did not exceed $38.2 million. We are concerned that the substantial cost overruns significantly reduce the savings that can be expected from this project. Coincidentally, because of recent large increases in diesel fuel prices the prospects for the benefits of this project look more promising.

92. **Recommendation.** The Yukon Energy Corporation should establish sound financial management and cost controls for implementing capital projects. Such controls should ensure that the scope and costs of projects remain within the approved budgets and that change orders and cost overruns are properly authorized.

Management's response. While the internal control systems at the Yukon Energy Corporation have generally been found to be free of material weaknesses, management acknowledges that the execution of the Mayo-Dawson project circumvented normal processes and controls. The situation should be prevented in the future as a result of process changes and improvements in corporate governance.

Adherence to original specifications

Deficiencies remain in final delivered product

93. The design-build agreement sets out in detail the requirements that the contractor must perform and adhere to in the design, construction, and commissioning of the project. It includes a statement that the intent of the agreement is to produce "first class design and construction work". It also stipulates adherence to standards of the electric utility industry.

94. As already noted, the design-build agreement clearly set out the contractor's obligation to submit drawings to the YEC for approval before commencing work. In a project of this nature, it is important that accurate, certified drawings be available before construction begins. This did not happen. Indeed, the problems encountered during commissioning and the deficiency list prepared by the Corporation showed design and wiring errors, equipment adjustment problems, and poor workmanship. The contractor, however, believes that its drawings met industry standards.

95. The design-build agreement also required the contractor to apply to the Corporation for a "certificate of total completion" once all the construction work had been completed to meet the requirements of the contract and all deficiencies had been rectified to the Corporation's satisfaction. The Corporation would then issue the certificate and pay the contractor the unpaid balance of the contract price including the performance holdback.

96. In January 2004, the Corporation issued the above certificate after the two parties had entered into the agreement mentioned in paragraph 79 of this report. The Corporation agreed to release the construction contractor from its warranty obligations under the contract in the transmission line component of the work. This release did not apply to the contractor's warranty obligations for any other component of the work, including the substation component. The Corporation also agreed that, except as otherwise indicated in the agreement made on 16 January 2004, the construction contractor would not be responsible for the deficiencies and incomplete work previously identified by the Corporation, agreed on by the two parties, or determined by the referee.

97. In agreeing on the completion of the project, the Corporation and the construction contractor came to a compromise on the drawings of the transmission system. The Corporation accepted delivery of the drawings as they had existed on 23 December 2003 and agreed to complete them itself.

98. The Corporation believes that there was a design deficiency in the transmission line, because it is susceptible to vibration as a result of the high conductor tension. This could increase the costs of maintenance and operations over the life of the project. In late 2004, the Corporation contracted with a company to install vibration dampers on the line at a cost of about $1 million.

99. The Corporation also claimed that the construction contractor did not meet contractual obligations to use certain "low loss" specifications for major pieces of electrical equipment (including transformers, reactors, and the synchronous condenser). The Corporation believes that this will result in higher costs of energy for the life of the project because the equipment installed consumes more power than was planned for and specified in the agreement. The Corporation submitted a claim of $530,000, which the contractor has disputed.

100. At the end of the audit fieldwork, the Corporation advised us that only a few outages had occurred since the transmission system became operational in September 2003. Although the design-build agreement specifically stated that the Corporation's intent was to receive "first class design and construction work," in light of the many deficiencies and problems encountered during construction and commissioning of the project it appears that this intent was not met.

Rate review by the Yukon Utilities Board

Need for a comprehensive examination of project costs

101. The YEC is committed to the position that this project will have no adverse impact on ratepayers. Considering the significant cost overruns incurred by the Corporation in implementing this project, we believe it would be important for the Yukon Utilities Board to undertake a comprehensive examination of the project's capital and operating costs as well as any outstanding problems when the Corporation seeks to recover the costs of the project. This would help to determine whether or not the project has any negative impact on electricity rates.

Conclusion

102. The Mayo-Dawson City transmission system project is the largest capital project the YEC has ever undertaken. However, the Corporation lacked the experience and expertise to carry out a project of this nature and magnitude. While the need, feasibility, and benefits of the project were well justified, the project scope and costs were not adequately defined. The YEC's Board of Directors was not fully briefed about the risks associated with using the design-build approach for this project without the required experience and expertise. Nor did the board of directors and management ensure that the Corporation established sound policies and practices or provided sufficient oversight and control over the implementation of this project.

103. The Corporation does not have a policy that establishes standards and procedures for project management. Project management was weak. Roles, responsibilities, and accountability were not clearly defined. Numerous problems and significant delays were encountered in implementing the project. Deficiencies remain in the final delivered product. It does not appear that the intent of the Corporation—to receive first class design and construction work—was met.

104. We identified significant deficiencies in contracting for construction and services. There was no established contracting policy to require that contracts be awarded on a competitive basis and no clear contracting procedures, including established financial limits or thresholds.

105. Financial management and project cost controls were inadequate. There were significant cost overruns in completing the project. We are concerned that the substantial cost overruns significantly reduce the savings that can be expected from this project. As the YEC is committed to the position that this

project will have no adverse impact on ratepayers, we believe it would be important for the Yukon Utilities Board to undertake a comprehensive examination of the project's costs when the Corporation seeks to recover them.

About the Audit

Objectives

To determine the extent to which the Mayo-Dawson City transmission system project

- was adequately defined in terms of scope, costs, and benefits;
- was subject to appropriate project management, control, and accountability; and
- resulted in a quality product that met original specifications.

Scope and approach

The audit examined key aspects of the Mayo-Dawson City transmission system project activities, including

- feasibility and cost-benefit analysis,
- overall project management,
- contracting practices,
- management of project implementation,
- financial management and project cost controls, and
- adherence to original project specifications.

We reviewed project files, financial management systems, and project cost control systems. We also interviewed program managers and corporation officials. We did not examine the records of the contractors.

Audit criteria

- The need for the project should be well defined and should be directly related to corporate objectives.
- Feasibility and options that could potentially fulfill defined requirements should be identified and analyzed.
- The selected option for developing and implementing the project should be translated into a project that clearly states objectives and contains work packages, schedule, budgets, organization, and controls.
- Contracting should
  - conform to established policies;
  - be based on requirements arising from the project definition;
  - incorporate authorized changes; and
  - be in keeping with well established principles including project organization, budgeting, scheduling, control, and reporting.
- The design-build process should be clearly defined in terms of design and drawing requirements, and those requirements should be communicated to the parties responsible for design.
- Overall project management should be in accordance with well established principles of project management.
- The project requirements should be satisfied and the project commissioned with minimum cost and disruption.
- The end product should meet the original specifications.
- Appropriate project accounting and financial controls should be in place.
- Responsibility and accountability should be clearly defined and communicated.

Audit team

Assistant Auditor General: Ronald C. Thompson
Principal: Eric Hellsten
Director: Gerry Chu

Lana Lin

For information, please contact Communications at (613) 995-3708 or 1-888-761-5953 (toll-free).

REFERENCE: **Tab 7, Schedule 2, Line 5**

PREAMBLE:

Yukon Electrical needs to understand the calculation of the lag days used in the working capital calculation.

QUESTION:

a) Please provide a complete copy of the lead lag study performed to develop the lag days of 27/365 used on Schedule 2.

b) Please confirm that the data used in this calculation was from 2005.

c) If confirmed, please explain why a more recent study using 2007 actual was not performed.

d) If not confirmed, please provide the date of the last study completed.

ANSWER:

(a)

Please see Attachment 1 to this response provided as Tab 10 to the 2005 Required Revenues and Related Matters Application.

(b)

Confirmed. The analysis used forecast 2005 data.

(c) and **(d)**

Yukon Energy has sought to maintain a simple and streamlined approach to GRA matters, to help keep regulatory costs down. For this reason, not every major analytical component of a GRA is intended to be thoroughly revised each GRA. For example, given the recent (2005) work on depreciation and working capital, these items were not repeated for the present GRA.

There is no reason to expect a material change in revenue requirement would arise from completing another full review at this time.

Schedule 10.1
Yukon Energy Corporation
Working Capital Calculation

	Days
Average Lag in revenue collection	33
Less: average lag in payment of operating expenses	6
Net revenue lag	27

Schedule 10.2
Yukon Energy Corporation
Calculation of Average Revenue Lag

Revenue Type	2005 Budgeted Revenue ($000s)	Lag Days	Weighted Revenue ($000s)
Retail (incl Rider J)	4,783	47.84	228,811
Wholesale (incl Rider J)	20,681	30	620,430
	25,464	33	849,241

Yukon Energy's Revenue lag has decreased slightly since 1997 due to the elimination of industrial customers, which had a slightly higher than average lag, and the growth in wholesales, which have a slightly lower than average lag.

Schedule 10.3
Yukon Energy Corporation
Calculation of Operating Expense (Lead) Lag

	Expenses ($000s)	(Lead) Lag Days	Weighted Expenses ($000s)
Salaries and Wages			
Payments to Employees	5,476	7.50	41,071
Overtime and standby	438	22.50	9,855
Fuel	213	18.14	3,864
Purchased Power	38	30.00	1,140
Property taxes	250	(2.04)	(510)
Other Operating Expenses			
Insurance	910	(190.97)	(173,783)
Company benefits	943	30.00	28,288
Employee travel and expenses	475	20.00	9,506
Other	4,612	35.00	161,420
	13,355	6	80,851

The expense (lead) lag days has changed significantly from the 1996/97 GRA (14 days) due largely to a reduction in fuel expense, which had been a substantial expense that had a longer than average lag. In addition, insurance has a substantial lead, and has increased as a percentage of YEC's overall expenses.

REFERENCE: Distribution Projects Page 5-15

PREAMBLE:

Yukon Electrical wishes to understand the improvements that may be required on the Whitehorse Dam.

QUESTION:

a) Please provide a copy of the study undertaken in 2008 for the Whitehorse dam, as shown on lines 3-7 on page 5-15? What process was undertaken to select a vendor to do this study? In providing this response, identify how many vendors were invited to bid and the respective bid amounts.

b) What have been the costs associated with the excessive wear on the gate hoist machinery?

c) For each of the years 2005 to 2009, provide the amount of extra labour costs incurred to ensure the gates do not freeze in the winter.

ANSWER:

(a)

The requested information cannot be provided. Due to changes in priorities, this project was deferred until 2010.

(b)

Costs are not tracked to a sufficient level of detail to identify the cost of the excessive wear.

(c)

The only extra labour costs relating to the gate hoist equipment are overtime that may have been required. Overtime is not tracked to this level of detail and therefore this number is not available and cannot be provided.

REFERENCE: Distribution Projects Page 5-18- line assessment phase 2 Carmacks- Faro

PREAMBLE:

Yukon Electrical is seeking more information on the Carmacks- Faro Phase 2 project.

QUESTION:

a) Please provide the detailed costs associated with the line assessment being the Phase 2 Carmacks-Faro transmission line. Please include, labour, material, contractor and other costs. Please explain how this study differs from the study that was undertaken in 2004 by YEC.

b) Please provide copies of YEC's Asset Management program as well as all end-of-life studies performed by YEC since 2004.

ANSWER:

(a)

The costs for this project are as follows:

Item	**Cost**
YEC Labour & Expenses	$ 6,566
Contractors	$ 176,041
Materials	$ 3,637
ES&G/AFUDC	$ 20,475
Total	$ **206,720**

The study performed in 2004 was completed on the line to Aishihik (L171), MacIntyre Connection (L169) and the Takhini – Riverside line (L172). The study performed in 2008 was on the Takhini – Carmacks – Faro line (L170).

(b)

Yukon Energy has not completed any end-of-life studies since 2004 (outside of the Mirrlees Life Extension project which was filed and reviewed extensively the 20 Year Resource Plan hearing). During the 2005 Required Revenues and Related Matters hearing, Yukon Energy filed three extensive condition assessment reports on its key assets. These reports remain the guiding documents in use in respect of asset assessment.

REFERENCE:

PREAMBLE:

Yukon Electrical would like to better understand the rational for the standards adopted by YEC for transmission infrastructure.

QUESTION:

a) Please list the third party consultant YEC engaged when selecting the design standard for the Mayo/Dawson 69KV line and the costs associated with this vendor.

b) Please provide the rational for the type of structures and transmission voltage selected for the Mayo/Dawson 69KV transmission line.

c) Please provide the same detail as in (b) above for the structures selected for the CSTP.

d) Please provide a list of the external consultants procured by YEC to design, construct, and site manage the CSTP project. In addition, please provide the costs associated with each of the external consultants.

e) Please provide all contracts that YEC established for the construction of the CSTP/Minto Mine Spur, including contracts with First Nations and Valard Construction.

ANSWER:

(a)

YEC used BC Hydro International (BCHIL) as its design consultant on this project. The costs are not relevant to this proceeding as the project costs were extensively reviewed at the 2005 Required Revenues and Related Matters hearing and accepted into rate base as part of $1.649 million in feasibility studies.[1]

[1] See YUB-YEC-1-19, filed during the Required Revenues and Related Matters hearing.

(b)

Issues relating to design, construction and costs of the Mayo Dawson line were fully canvassed at the 2005 Required Revenues and Related Matters hearing and therefore not relevant to this GRA.

(c)

The CSTP Stage I was the first phase of a possible two phase project to connect the WAF grid with the MD grid. This entailed a new transmission line approximately 250 km in length for both phases. This length at any lower voltage would have resulted in unacceptable line losses. Any higher voltage would have resulted in capital costs which were too high. Since the connection was to the existing WAF grid at 138 kV, it was determined that this would be the best choice.

The choice of structure design was made based on industry practice. This design is a standard for utilities in Canada

(d)

Please see table provided below.

Role	Consultant Name	Contract Cost ($000's)
Design	Wardrop	1.372
Line Construction	Valard	19.844
Substation Construction	F&M Installations	4.684
Site Management	Wardrop	1.348

(e)

Contracts with third parties are treated by Yukon Energy as confidential. Yukon Energy is prepared to provide the Board with copies of the contracts on a confidential basis if the Board believes they are relevant or necessary to allow the Board to gain a satisfactory understanding of the matters that need to be considered in this Application.

REFERENCE: **Pages 2-5 to 2-7 of Application; Page 2-16 Table 2; Schedule A Industrial Primary Rate Schedule 39**

PREAMBLE:

YEC is forecasting 6,845 MW.h of major industrial sales in 2008 and 29,023 MW.h in 2009. This is slightly lower than the 32,500 MW.h per year assumed in the Power Purchase Agreement ("PPA") Application for Minto filed in February 2007, and reflects the fact that several loads included in the original assumptions provided by Minto Explorations were not ultimately required

QUESTION:

a) On a monthly basis for 2008 and 2009, please provide all the billing determinants for industrial sales (Demand Charge, Energy Charge, Fixed Charge) that result in total forecast revenues of $709,000 in 2008 and $3,142,000 in 2009.

b) Please detail the due diligence and analysis performed by YEC to prepare the industrial sales forecast including an analysis of the underlying load assumptions used in the preparation of the GRA forecast as compared to the underlying load assumptions used in the preparation of the PPA. Please comment on the factors that would result in actual sales being higher or lower than forecast.

c) Please comment on the impact of the worsening world and Canadian economic situation and outlook on YEC's industrial sales forecast.

d) Please confirm that YEC is holding a security deposit for its new industrial customer per Section 4.9 of the Electric Service Regulations. If not, please explain why and detail the security that YEC has in place with respect to collection risk on energy sales to Minto Explorations.

e) Using the same load forecast in 2010 as used for 2009 as well the most recently available chain price index, please provide the forecast revenue increase for 2010 as a result of the escalation of demand and energy charges based on

the 12 month implicit chain price index for gross domestic product at market prices for Canada as reported by Statistics Canada.

f) Please provide a copy of the YEC / Minto Explorations PPA that was signed off by representatives of YEC and Minto Explorations, filed with the Board on May 14, 2007 and approved by the Board in Board Order 2007-6.

g) Further to YEC stating it expected to commence PPA discussions with Western Copper later in 2008 (page 2-7), please provide an update on the status of these PPA discussions and the impact on YEC's longer term load forecast relating to this customer.

h) Further to YEC stating it expected to discuss a PPA with Alexco Resource Corp. (Alexco) later in 2008 (page 2-7), please provide an update on the status of these PPA discussions and the impact on YEC's longer term load forecast relating to this customer.

i) Further to YEC stating there are other near-term mine developments in the next 4 to 7 years, please provide an update on these near-term mine developments and the impact on YEC's longer term load forecast.

ANSWER:

(a)

Please see the tables below.

Revenue from Industrial Sales (2008 Forecast)

Month	Demand Charge @ $15.0 / kv.a	Energy Charge @ $ 0.076 / kW.h	Total Revenue
Jan	-	-	-
Feb	-	-	-
Mar	-	-	-
Apr	-	-	-
May	-	-	-
Jun	-	-	-
Jul	-	-	-
Aug	-	-	-
Sep	-	-	-
Oct	63,000	175,286	238,286
Nov	63,000	169,632	232,632
Dec	63,000	175,286	238,286
Total			709,205

Revenue from Industrial Sales (2009 Forecast)

Month	Demand Charge @ $15.0 / kv.a	Energy Charge @ $ 0.076 / kW.h	Total Revenue
Jan	78,000	187,337	265,337
Feb	78,000	169,208	247,208
Mar	78,000	187,337	265,337
Apr	78,000	181,294	259,294
May	78,000	187,337	265,337
Jun	78,000	181,294	259,294
Jul	78,000	187,337	265,337
Aug	78,000	187,337	265,337
Sep	78,000	181,294	259,294
Oct	78,000	187,337	265,337
Nov	78,000	181,294	259,294
Dec	78,000	187,337	265,337
Total			3,141,746

(b)

Yukon Energy prepared the GRA industrial load forecast based on input from Minto. With respect to variance from PPA loads, please see YUB-YEC-1-2.

(c)

Based on conditions as currently understood the Minto operations are expected to generally evolve as previously assumed. Alexco operations are still assumed to be connected as an industrial customer in 2010. It is possible other potential new industrial connections may experience delays related to accessibility of financing and to allow for recovery of commodity prices. However, YEC has been focusing on essential requirements and to date has not had opportunities to discuss these issues with potential other new industrial connections.

(d)

Not confirmed. Security for collection risk on sales to the Mine is covered by section 6.5 of the Power Purchase Agreement.

(e)

The requested information is not relevant to the current Application.

(f)

Please see response to CW-YEC-1-1.

(g)

Please see response to LE-YEC-1-62.

(h)

Please see response to LE-YEC-1-8. Current information on industrial loads is provided in CW-YEC-1-31(a).

(i)

The information provided at Tab 2 of the Application (pages 2-6 and 2-7) remains current.

REFERENCE: **Introduction to application page 11**

PREAMBLE:

Under b. Firm Electric Heating YEC states "it is imperative that customers today do not receive price signals that encourage the installation of inefficient baseboard electric heating…."

QUESTION:

a) Please provide copies of any analysis undertaken by YEC to support the view that the use of baseboard heating contributes significantly to system load in the Yukon.

b) Please provide copies of all meeting minutes or notes whereby YEC consulted with Yukon Electrical, as the primary distributor and customer contact in the Yukon, as it relates to energy planning for the Yukon.

ANSWER:

(a)

Yukon Energy has not conducted any analysis that indicates the extent of baseboard electric heating load. Yukon Energy has conducted analysis that, at present run out rates, the economic incentive for baseboard heating is out of step with the principles of economy and efficiency as set out in OIC 1995/90, as illustrated at pages 4-10 to 4-14 of the Application.

(b)

Please see YECL-YEC-1-26(c).

REFERENCE: **Page 2-19**

PREAMBLE:

Line 3 losses %. Yukon Electrical would like more information on line losses

QUESTION:

a) Please provide a breakdown of the line loss total into the Mayo Dawson versus WAF grids.

b) Please comment on the difference in loss percentages and any plans in the test periods to improve upon the efficiencies in the respective systems.

ANSWER:

(a)

The requested information is provided below.

Breakdown of the Line Loss Total for the Years 2005-2009

	Actual 2005	Actual 2006	Actual 2007	Forecast 2008	Forecast 2009
WAF Grid Losses - MWh	18,669	18,747	19,542	21,915	22,337
MD Grid Losses - MWh	5,288	6,137	5,489	5,440	6,608
Total Losses	23,957	24,884	25,031	27,355	28,945
WAF Sales - MWh	264,975	280,728	285,820	293,618	319,107
WAF Losses - %	7.05%	6.68%	6.84%	7.46%	7.00%
MD Sales - MWh	20,254	21,305	22,022	22,412	24,474
MD Losses - %	26.11%	28.80%	24.92%	24.27%	27.00%

(b)

Please see response to YECL-YEC-1-2(f). There are no specific plans for reduction in losses at this time.

REFERENCE: Introduction Page 1-3

PREAMBLE:

Throughout its application YEC refers to the 20 Year Resource Plan

QUESTION:

a) Has the 20 Year Resource Plan been approved for implementation? If so under which authority has it been approved? Please provide a copy of the approval.

b) What aspects of the 20 year plan have been implemented and what have been the costs associated with implementing each aspect of the Plan?

c) Did YEC consult with Yukon Electrical on the 20 Year Plan? If not, why not? If so, please provide all documentation in YEC's possession regarding such discussions.

d) Does YEC support ongoing consultation with Yukon Electrical on system planning matters, as Yukon Electrical serves the majority of the customers in the Yukon? If not, why not? If so, please provide the details of how YEC plans to include Yukon Electrical and its customers in the system planning process?

e) Will the proposed 3rd wheel at Aishihik increase the maximum amount of MW that YEC will be able to supply to the grid? If so, how many additional MWs will be generated? How long would this increased amount of MW be sustained?

ANSWER:

(a)

The 20 Year Resource Plan was reviewed in detail by the Board and interested parties and the YUB provided its views and recommendations relative to all sections of the report to the government.

(b)

The 20 Year Resource Plan Recommendations and Proposed Actions have been pursued as follows:

- Chapter 3: Yukon Energy operates with updated Capacity Planning Criteria. No specific costs are associated with this item.

- Chapter 4 Proposed Actions (costs as noted for capital projects in Tab 5)
  - Item 1: Aishihik 3rd turbine is being pursued – see YUB-YEC-I-27(b).
  - Item 2: Marsh Fall/Winter Storage remains an attractive project as noted in YUB-YEC-I-27(a).
  - Item 3: Carmacks-Stewart Transmission Project Stage I is now in service, and Stage II remains a project under active planning.
  - Item 4 and 5: Mirrlees Life Extension Project is underway, with units at Faro and Whitehorse in service in the test years, and two additional units at Whitehorse scheduled for beyond the test years.
  - Item 6: Ongoing monitoring of loads, including industrial, is an active YEC assignment. Major loads including Alexco, Western Copper, the Faro reclamation activities, and other potential customers are tracked. No specific cost for this activity is identified.
  - Item 7: Other small enhancement projects have been pursued – the Southern Lakes study is complete largely in relation to Marsh Lake. Re-runnering hydro units is an active opportunity YEC continues to review, and will implement in the event economically feasible. YEC has rejected the concept of a 1 MW diesel at Carcross as new capacity is not required on the WAF system at this time.

- Chapter 5 Proposed Actions (costs as noted in Tab 5)
  - 10 MW scenario:
    - Aishihik Diversions and Atlin Storage are projects that are being considered for advancement (see page 5-20).
    - System-wide water and load dispatch model development is completed
    - Assessment of the Southern Lakes has been initiated with hydrology studies; the potential for water control structures has an initial focus on Atlin Lake.
    - Mayo Hydro enhancements are in active planning.

- WAF new small hydro has been investigated (e.g., Drury), with the conclusion that Mayo B is preferable in the near-term.
- DSM: Activities focus on support for Yukon Government initiatives.

- 25 MW scenario: In addition to 10 MW scenario
  - Update WAF hydro information for larger potential generation (e.g., Hoole Canyon).
  - Prepare initial pre-feasibility concept on major wind generation development.
- 40 MW and 120-360 MW Scenarios – no activity.
- Pre-commitment activities:
  - Monitoring industrial load developments – see above.
  - Southern Lakes Hydrology – see above.
  - Other existing Hydro Facility Enhancements – see above.
  - Level 1 and 2 assessments to identify preferred 5-30 MW scale Yukon hydro sites – see above.
  - Ongoing monitoring of hydrology – being undertaken at this time in conjunction with potential resources in the Aishihik area.

(c)

Yukon Energy sought the involvement of YECL in Resource Plan activities, both prior to and during the regulatory hearing. From July 2005 through November 2005, Yukon Energy provided both written requests and in person discussions requesting YECL's cooperation in the exercise of developing a 20-Year Resource Plan. Attached (attachments YECL-YEC-1-26(c) 1-4) is all correspondence YEC could readily locate in regards to those attempts at consultation.

In regards to the regulatory review, in its September 25, 2006 letter to the YUB, YECL noted that it would "…no longer actively participate in the current review of YEC's 20 Year Resource Plan; but will focus its attention on the significant regulatory projects that are expected to be brought before the Yukon Utilities Board under Part 3 of the Act."

(d)

Yukon Energy routinely works with YECL on distribution planning matters where the two utilities interface. As part of any next update to the major Resource Plan, Yukon Energy

expects opportunities for involvement of YECL and customers, in the event they elect to participate.

As the primary generator and transmitter of power in Yukon, Yukon Energy is required to maintain day-to-day responsibility over ongoing system planning activities in these functions.

(e)

The proposed third wheel at Aishihik is 7 MW. Yukon Energy has not yet proposed an operational plan for the unit. Opportunities to generate will be sustained as long as there is water in Aishihik Lake above the minimum level of Yukon Energy's licence.

YUKON ENERGY CORPORATION
P.O. Box 5920
WHITEHORSE
YUKON Y1A 5L6
(867) 393-5300

0310-03-04

July 18, 2005

Doug Tenney
The Yukon Electrical Company Limited
100, 1100 First Avenue
Whitehorse, YT
Y1A 3T4

Dear Doug,

Yukon Energy is currently undergoing planning with respect to major generation and transmission infrastructure. This planning process is intended to determine the bulk power requirements of the WAF and Mayo-Dawson systems, as well as potential for future interconnection to isolated systems.

In this regard, given the large part of our load accounted for by Yukon Electrical, we have identified below specific information from YECL that would assist with respect to our current planning for bulk power supply in Yukon. We have attempted to address these requirements in a form that we assume is readily available from Alberta Power as it was produced in past YUB hearings (and is expected to be required in future for YUB proceedings). However, if the same data is more easily produced in a different format using today's computer systems, that would be acceptable as well.

1. ***Actual Loads:*** The actual loads and customer numbers by customer class and community for the last 3 fiscal years. It may be helpful if it can be produced in the form of CI-YEC/YECL-23 from the 1993/94 GRA as it relates to YECL, particularly Tables 5 to 7 (energy loads, losses and supply by rate schedule), Tables 8 to 10 (showing demand loads, losses and supply by rate schedule; please confirm that these are coincident peak values), Tables 11 to 13 (showing customer numbers by rate schedule), and Table 17 (losses and supply by community).
2. ***Forecast Loads:*** Please provide any current forecasts of the loads and customer numbers similar to the actuals provided in bullet 1 above, to the extent that this information is available within YECL. Please also provide any long-term load growth assumption used by YECL in its planning exercises to ensure consistency between the two utilities.
3. ***Generator Complement:*** Please provide an update of the interrogatory response UCG-YEC/YECL-1-73 from the 1996/97 GRA indicating the YECL diesel generator inventory and planned retirement dates (we do not require the data in the final column on book value). Please also indicate any planned additions or replacements to any of the diesel units on each system.

4. ***Fish Lake Hydro:*** Please provide the actuals for Fish Lake hydro for the last three years. In addition, please provide any new assumed long-term average output, any planned improvements to change the average output, any assumed low flow reliable winter period output at time of WAF peak, or if there are any established retirement dates. This would include any impacts on the reliable low flow peak to increase or decrease the currently assumed 1 MW of peak winter capability.

We are attempting to deal with this bulk power planning exercise expeditiously. If some material can be provided easily, while other material will require some time, we would appreciate receiving what is readily available as soon as possible, preferably within the next two to three weeks. Please let me know if there is anything we can do to help clarify and deal with the above.

Sincerely,

David Morrison
President

YUKON ENERGY

COPY

YUKON ENERGY CORPORATION
P.O. Box 5920
WHITEHORSE
YUKON Y1A 5L6
(867) 393-5300

September 12, 2005

Doug Tenney
The Yukon Electrical Company Limited
100, 1100 First Avenue
Whitehorse, YT
Y1A 3T4

Dear Doug,

On Wednesday August 24th, 2005 during our meeting at Yukon Energy's offices, you indicated that YECL was not willing, for reasons of commercial competition (as I understood your position), to share any of the YECL load and generation information that YEC had requested in its letter of July 18th. I have reviewed this matter further and I would like you to reconsider your position. I sincerely hope with the further explanation provided below YECL will better understand why Yukon Energy is seeking YECL's cooperation in YEC's bulk power planning exercise and as a result will provide the information requested.

As originally noted in our July 18th letter, YEC is attempting to deal with its generation and transmission resource planning exercise in an expedited manner hence the reason why we were requesting the information be provided quickly. However, given your initial reaction to YEC's request I think it would be helpful to explain in more detail why YEC needs the information requested.

As was indicated in our July 18th letter, Yukon Energy has undertaken a major review of its present and future generation and transmission infrastructure systems needs including a complete condition assessment of our major infrastructure and a review of the capacity planning criteria presently in use for Yukon's grid systems. It is our expectation that this exercise will ultimately lead to a review by the YUB of Yukon Energy's twenty year resource use plan.

The last time that the YUB reviewed such major capital plans and projects, it recommended in its December 7, 1992 Report to Commissioner in Executive Council (in the Load Forecasts section) that the Utilities provide detailed support for their load forecasts:

> *... the Board agrees with the position of the City of Whitehorse, and recommends that a more rigorous approach to forecasting use per customer be taken by the*

Companies. In future general rate applications or review of capital plans, the Companies should be able to provide detailed support for such forecasts.

Obviously, we are interested in ensuring that such "detailed support" is available for any YUB review of our capital plans that involves forecasting use per customer and other similar planning elements relevant to Yukon bulk power system planning.

Given that YECL represents the majority of Yukon Energy's load on WAF and is also a regulated utility, necessary information that would be provided in the normal regulatory review process was accordingly requested from YECL to assist in Yukon Energy's planning. Cooperation with Yukon Electrical is a critical precondition if we are to provide the "detailed support" recommended by the YUB. Our request focused on the integrated WAF and Mayo-Dawson grids and potential for future interconnection to isolated systems, specifically requesting typical information that YECL would provide in any GRA (and in fact, as indicated in the letter, is based on requests from the 1993/94 GRA and the 1996/97 GRA, which YECL fully responded to at that time). With regard to loads, we attempted to focus our request on customer class information. We were not attempting to obtain confidential information on any individual customers.

Hopefully with this further explanation Yukon Electrical will reconsider its decision. However, if you have any further questions or concerns in this regard, please let me know as soon as possible so that we can assist in moving forward in a timely way.

On a related note, before we conclude our current planning exercise, Yukon Energy would like to meet with you to brief Yukon Electrical on the matters being discussed as part of this resource planning process. Such a meeting would also allow us to obtain YECL's input on these matters. Please let me know about Yukon Electrical's interest and availability for such a session.

Sincerely,

David Morrison
President

YUKON ENERGY

YUKON ENERGY CORPORATION
P.O. Box 5920
WHITEHORSE
YUKON Y1A 5L6
(867) 393-5300

0310-03-04

November 25, 2005

COPY

Mr. Doug Tenney
The Yukon Electrical Company Limited
100, 1100 First Avenue
Whitehorse, YT
Y1A 3T4

Dear Doug,

I am writing to remind you of the September 12th, 2005 letter I sent you as a follow-up to our Wednesday August 24th, 2005 meeting at Yukon Energy's offices.

At our August 24th, 2005 meeting, you indicated that YECL was not willing, for reasons of commercial competition (as I understood your position), to share any of the YECL load and generation information that YEC had requested in its letter of July 18th. In my September 12th, 2005 letter, I asked you to reconsider this position and to cooperate with our current generation and transmission resource use planning by providing readily available information that historically has been provided by YECL in past GRAs.

As noted, Yukon Energy's request was consistent with the YUB's recommendation from its December 7, 1992 Report to Commissioner in Executive Council (in the Load Forecasts section) that the Utilities provide detailed support for their load forecasts. As I also indicated in my September 12th, 2005 letter, with regard to loads, we attempted to focus our request on customer class information. We were not attempting to obtain confidential information on any individual customers.

We have obviously carried on without the YECL data. However, I would still appreciate a response to clarify Yukon Electrical's position on these matters before we finish our current work and any filings with the Yukon Utilities Board, and in particular to confirm if YECL is now taking the position that any such data will no longer be made available and/or to clarify under what conditions it will be provided in future.

Yours truly

David Morrison
President

The Yukon Electrical Company Limited
An *ATCO* Company

December 7, 2005

Mr. David Morrison
President
Yukon Energy Corporation
PO Box 5920
Whitehorse, Yukon
Y1A 5L6

Re: Generation and Transmission Planning in Yukon

Dear Mr. Morrison:

On July 18, 2005, you wrote to Yukon Electrical requesting a variety of information including actual load, forecast load, generation inventory and generation planned retirement dates for both grid and non-grid communities for use in "our current planning for bulk power supply in Yukon." On August 24, we had an opportunity to meet face to face to discuss this request. During this meeting, I believe that I informed you that given the current structure of the electric industry in the Yukon, that Yukon Electrical wanted to have an opportunity to participate in any new generation or transmission facilities required in Yukon. To allow for this and to serve the public interest, Yukon Electrical believes that planning should be conducted jointly rather than by only one utility. As such the provision of all of the information requested by Yukon Energy would put Yukon Electrical at a competitive disadvantage.

It should also be remembered that on an annual basis, Yukon Electrical does provide Yukon Energy with a three year forecast of our purchase power requirements on the Whitehorse-Aishihik-Faro grid as well as actual and forecast Fish Lake Hydro generation.

On September 12, Yukon Energy wrote back in response to the August 24th meeting. Yukon Energy reiterated that it was in the midst of "a major review of its present and future generation and transmission infrastructure system needs including a complete condition assessment of our major infrastructure and a review of the capacity planning criteria presently in use for the Yukon's grid systems." (emphasis added) Again, Yukon Electrical took this to mean that Yukon Energy alone was planning the system requirements.

The September 12th letter went on to state, as justification for why Yukon Electrical should now provide the data requested, that the YUB in its December 7, 1992 Report to Commissioner in Executive Council regarding sales forecasts stated "In future general rate applications or review of capital plans, the Companies should be able to provide detailed support of such forecasts." It should be remembered, that at the time that the YUB made this comment, the two companies were jointly managed and thus had joint

THE YUKON ELECTRICAL COMPANY LIMITED
An ATCO Company

system planning. Effective January 1, 1998, the joint management ceased and to-date, no process for joint planning has been implemented. As well, as YEC intends on filing its capital plan with the YUB, it should be ready and able to defend its sales forecast no differently than it did in its 2005 Required Revenues and Related Matters Application.

It should be clear that Yukon Electrical believes that joint planning of the generation and transmission requirements of Yukon needs only to address:

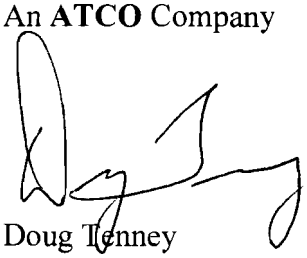
- the current and forecast load,
- the current capacity of the system including planned retirements, and
- the planning criteria to be used in determining the need for new generation and transmission on the system.

The companies' specific plans to satisfy these requirements do not need to be shared as part of joint planning but rather will be the subject of review by the YUB as part of any energy project certification application by either company.

Yukon Energy, in its September 12th letter, offered to meet with Yukon Electrical prior to the completion of its exercise in order to obtain "Yukon Electrical's input" on these matters. At that time, Yukon Electrical believed, correctly or incorrectly, that the offer, should have taken place when the terms of reference and scope of the exercise were being developed. However, it is important that the planning of the Yukon's electrical requirements moves forward. To this end, Yukon Electric would like to meet with Yukon Energy so that both companies can share customer class actual and forecast sales data by community as well as generation capacities and planned retirement dates. Further discussion will be required for customer class coincident peak data as this information is not readily available and must be estimated in any event.

I trust that this clarifies Yukon Electrical's position and I want to inform you that Yukon Electrical is available to meet at your earliest convenience. Please call if you require any further clarification or wish to set a time to meet.

Yours truly,
THE YUKON ELECTRICAL COMPANY LIMITED
An **ATCO** Company



Doug Tenney
General Manager

Cc Sett Policicchio, President ATCO Electric

Printed on recycled paper

REFERENCE: **General**

PREAMBLE:

Yukon Electrical needs to understand YEC's accounting and regulatory practices.

QUESTION:

a) Please provide details, rationale, and support for, all changes to accounting policies since 2005.

b) Please provide details, rationale, options considered and support for all changes to regulatory practice since 2005.

ANSWER:

(a)

Please see response provided to CW-YEC-1-35.

(b)

The only change to regulatory practice since 2005 is the recent practice of the Board with respect to regulatory hearing costs. Previously, Yukon Energy had either expensed costs related to regulatory proceedings, or began amortizing the amounts over the period to which the hearing related. In recent Board Orders (CSTP Part 3, Resource Plan, and Minto PPA) the Board has directed YEC to maintain all costs in a hearing cost reserve account for amortization beginning at the next YEC GRA. This has been followed by YEC, as shown in Tables 5.3 to 5.7.

REFERENCE: **Page 4**

PREAMBLE:

"c. **Depreciation and Amortization Expenses** of $6.403 million for 2008 and $6.930 million for 2009 including approval to amortize the following regulatory costs: i. An estimated "placeholder" expense of $0.800 million related to costs for the current GRA (Phase I) Application, anticipated to be incurred over 2008 and 2009 for preparation and review of the Application and reimbursement of related intervenor and YUB costs, to be amortized over the 2 test years (2008 and 2009). The intensity and duration of the regulatory process cannot be determined at this time. Accordingly, Yukon Energy seeks approval to adjust the above amount to reflect the full actual amounts incurred or Ordered to be reimbursed at the time of the final refiling in the current GRA process, following receipt of all final Orders from the Board. No amounts have been estimated for any future Phase II GRA activities related to further rate design and/or cost of service study matters."

QUESTION:

a) Please provide complete details of all components of $800,000 estimate for rate case costs, including estimate for internal costs and external costs.

b) If estimate for costs includes use of consultants, please provide:
   i engagement letter and terms of reference;
   ii description of services being provided; and
   iii hourly rate being charged and hours estimated.

c) Please confirm that amortization of rate case costs of $400,000 is included in YEC's revenue requirement for each of 2008 and 2009.

d) Please provide a continuity schedule of this deferral account for the period 2005-2009 showing:
   i opening balance;
   ii rate case costs;
   iii amortization of rate case costs; and
   iv closing balance.

e) Please confirm that YEC's intent is to continue to include $400,000 in revenue requirement and amortization expense in 2010 and beyond if there is no rate case for 2010 and 2009 rates continue into 2010. If not confirmed, please fully explain why not.

ANSWER:

(a) and **(b)**

The "placeholder" estimate of $800,000 for rate case costs is a top-down estimate, as noted at page 4 of the application. All costs charged to the regulatory account are incremental costs (supplies, consultants, overtime, travel) and do not include normal staff salaries. No estimated breakdown between internal versus external costs is available.

(c)

Confirmed.

(d)

Please see Tables 5.3 to 5.7.

(e)

Not confirmed. If the hearing costs are fully amortized by the end of 2009, they will not be amortized in 2010.

Yukon Energy has not determined if 2010 will be a test year with its own revenue requirement being set by the Board. Absent such a process (such as a GRA), the 2009 rates will continue until such time as there is need to revise the rates for a future test year.

REFERENCE: **Page 5-23, Lines 11-16**

PREAMBLE:

QUESTION:

a) Please provide details of the costs that comprise the $46,000 in 2008 and $105,500 in 2009 required to investigate IFRS.

b) If any of the cost components in (a) above include payments to external consultants, please provide:
   i engagement letter and terms of reference;
   ii description of the services being provided; and
   iii the hourly rate being charged.

c) Please provide a status on what steps YEC has taken to date to be compliant with IFRS and provide YEC's detailed plan, including timelines, on what YEC is required to do to become compliant effective 2011.

ANSWER:

(a)

Yukon Energy appointed outside consultants to provide assistance with the required future conversion to International Financial Reporting Standards (IFRS) in 2008. Several conference calls were undertaken to discuss where the utility's progress with regard to the implementation of accounting standards as well as areas of potential concern.

Yukon Energy requested that the consultants perform a high level diagnostic and qualitative assessment designed to identify the main IFRS areas that the Utility needs to address.

The costs associated with 2009 relate to having the consultants visit Yukon Energy and provide the following services:

- Detailed assessment of identified areas;

- Training to staff and board members; and

- Assistance with the implementation of IFRS requirements on the new FIS system.

- To assist in the preparation and design of IFRS-compliant financial statements and business processes.

(b)

Please see response provided to **(a)** above. Yukon Energy has an engagement with KPMG on this matter. Details of specific contract terms are confidential.

(c)

Yukon Energy has completed a Quick Scan of the utility (high level diagnostic). The consultants have visited the site and collected information about YEC's system and processes. A shared site has been developed to allow direct communications between the Utility and the consultant. The consultant provided assistance with specifications for the new FIS system.

YEC is currently working on a more detailed plan, to meet the target implementation timing.

REFERENCE: **Page 3-12, Table 3.10**

PREAMBLE:

QUESTION:

a) For 2005-2009, please provide details of insurance coverage. Include information on the amount being covered, a description of each component of the coverage, as well as, the deductible and forecasted premiums for each policy for the coverage.

b) Please explain all changes to either the insurance coverage or the deductible since 2005.

c) Please discuss the interrelationships between coverage, deductibles and premiums and why the specific levels were arrived at for each policy included in (a) above.

ANSWER:

(a) and **(b)**

Please see table below.

Details of Insurance coverages, by year – part I

Year	Type	Description	Limits	Premium	Deductible
2008-2009	Property	Property and Equipment Breakdown	$250,000,000	$585,000	$100,000 except $250,000 equipment breakdown and $50,000 inland transit and course of construction
	Liability	Automobile Liability	$5,000,000	$79,022	$10,000 for Ford F800 and Crane Truck, $2,500 for all other vehicles and $1000 for trailers, snowmobiles and ATV's
	Liability	Excess General Liability	$50,000,000	$110,696	$250,000 for all losses except $500,000 for Pollution
	Liability	Non-owned Aviation	$5,000,000	$3,715	Nil
	Other	Directors' and Officers Liability	$10,000,000	$17,928	$50,000 Self Insured retention
	Other	Crime	$1,000,000	$3,255	$20,000
2007-2008	Property	Property/Inland Transit	$230,000,000	$499,100	$200,000 all Losses except $100,000 building and $50,000 Inland Transit. 48 hour waiting
	Property	Boiler & Machinery	$100,000,000	$100,000	$250,000 property damage.
	Liability	Auto Liability	$5,000,000	$77,646	$10,000 for Ford F800 and Crane Truck, $2,500 for all other vehicles and $1000 for trailers, snowmobiles and ATV's
	Liability	Excess General Liability	$50,000,000	$106,275	$250,000 all losses except $650,000 gradual pollution
	Liability	Non-owned Aviation	$5,000,000	$3,715	Nil
	Other	Directors' and Officers Liability	$10,000,000	$15,238	$20,000 each loss
	Other	Crime	$1,000,000	$3,255	$100,000

Details of Insurance coverages, by year – part II

2006-2007	Property	Property/Inland Transit	$230,000,000	$499,814	$200,000 except inland transit of $50,000
	Property	Boiler & Machinery	$100,000,000	$68,575	$250,000 except $500,000 for WD1, WD2 and WD3
	Liability	Auto Liability		$75,794	
	Liability	Excess General Liability	$50,000,000	$109,013	$250,000
	Liability	Non-owned Aviation		$3,910	
	Other	Directors' and Officers Liability	$10,000,000	$32,000	$100,000
	Other	Crime		$3,255	
2005-2006	Property	Property/Inland Transit	$230,000,000	$645,263	$200,000 except inland transit of $50,000 and $100,000 main office building
	Property	Boiler & Machinery			
	Liability	Auto Liability	$5,000,000	$71,084	$5,000 for Ford F800, $2,500 for all other vehicles and $1000 for trailers, snowmobiles and ATV's
	Liability	Excess General Liability	$50,000,000	$107,747	$250,000 except $650,000 pollution liability
	Liability	Non-owned Aviation	$5,000,000	$3,258	Nil
	Other	Directors' and Officers Liability	$10,000,000	$33,688	$100,000
	Other	Crime	$1,000,000	$3,100	$20,000

(c)

Yukon Energy has a professional broker who, among other things, provides management with recommendations on optimal coverage for a given cost given the industry sector and corporate risk profile. On any given renewal, pricing for coverage will fluctuate year over year. The broker reviews these changes and management assesses on a case-by-case basis how to balance premium cost vs. coverage.

REFERENCE: **Schedule 11 line 50**

PREAMBLE:

Other revenue decrease from $161,000 in 2006 to forecasts of $125,000 in each of 2008 and 2009.

QUESTION:

a) On annual basis from 2005 through to 2009, please provide details on Other Revenues and provide reasons for variances.

ANSWER:

(a)

Please see table provided below.

Other Revenues 2005 -2007 Actual and 2008 - 2009 Proposed

Other Revenue	2005 Actual	2006 Actual	2007 Actual	2008 Proposed	2009 Proposed
House/Office Rent	22	29	29		
Misc Revenue	57	103	8		
Stock Sales	2	3	0		
(Gain)Loss Disposition on F/A	(15)	(3)	(49)		
Revenue from YDC	225	204	146		
Revenue from ESC	181	73			
Cost of Services to YDC	(225)	(201)	(142)		
Cost of Services to ESC	(179)	(73)	(3)		
Cost of Goods	(55)	(98)	(5)		
Office Rent/Yard Rent	(14)	(1)	4		
Reconnection Fee	12	12	10	11	11
Penalty Charges	0	0	1		
Joint Pole Use	108	111	115	115	115
Total	**118**	**161**	**115**	**126**	**126**

REFERENCE: **Page 3-10 of the Application**

PREAMBLE:

Yukon Electrical wishes to understand Administration costs of YEC.

QUESTION:

a) Please provide a list of the training and conferences that have been attended by staff from 2005-2009. Please provide the location of the training, conferences and business related travel and the costs associated with each. Also, please provide any documented benefits that have been implemented as a result of the training/conference attendance.

ANSWER:

(a)

Please see Attachment 1 to this response. Out of Territory training was not available in Yukon. Documentation regarding benefits is not available.

2005 Training Costs

Department	# of Employees	Training Description	Cost	Location
				OT - Out of Territory
Engineering Services				
Supervisor, Mechanical Engineering	1	Installation Code for Oil-Burning Equip	285.00	Yukon
Civil Engineer	1	YESAAS Course	200.00	Yukon
Electrical Engineer	3	PLC Part II	450.00	Yukon
Electrical Engineer	1	Power Transformer Forum	1,519.60	OT
Electrical Engineer	1	High Voltage Substation Design	3,178.86	OT
Electrical Engineer	1	PLC Advanced Training	4,718.35	OT
Draftsperson	1	Staking and Easement Acquisition	4,331.96	OT
Draftsperson	1	Electrical course	514.02	Yukon
Electrican Capital Projects	1	Grounding in Power Systems	2,018.62	OT
Distribution Technologist	1	Fund Electrical Distribution	3,252.31	OT
Electrical Engineer	2	PLC Part I - 2004 costs	300.00	Yukon
Land Technician	1	Conflict Management	350.00	Yukon
Land Technician	1	Communicating in Conflict	250.00	Yukon
Coordinator, Property & Projects	1	Installation Code for Oil-Burning Equip	200.00	Yukon
Resource Mgt Eng	1	YESAAS Course	200.00	Yukon
Resource Mgt Eng	1	Visible Emissions Certification	400.00	Yukon
Technical Services	13	Monthly working lunches	747.85	Yukon
		Sub-Total Technical Services	**22,916.57**	
Operations				
Director	1	Employment and Human Rights Laws for Managers	2,461.00	OT
Manager	1	Electrical Safety in The Workplace	1,632.12	OT
Manager	1	CEA Health & Safety Course	1,060.84	OT
Manager	1	Lancaster House	390.00	Yukon
Leadhand, SCC	1	Purchasing course	1,576.21	OT
Leadhand, Electrical	1	Electrical Testing	649.00	Yukon
Leadhand, Electrical	1	Leading High Performance Teams	2,380.40	OT
Leadhand, Electrical	1	Coaching & Mentoring	995.00	OT
Mtce Electrician	1	PSE Apprenticeship	3,023.66	OT
Mtce Electrician	1	Electrical Maintenance Forum	1,649.37	OT
Mtce Electrician	1	Technical course	3,099.21	OT
Leadhand, T & D	1	T & D conference	3,391.82	OT
Line Tech - Mayo	1	GPS Training	100.00	Yukon
Plant Operator/Tradesperson	1	Apprenticeship	165.30	Yukon
		Sub-Total Operations	**22,573.93**	
Finance				
Controller	1	Writing	424.10	Yukon
Controller	2	CICA Handbook Update	4,091.78	OT
Controller	1	Financial Statement Presentations	325.00	Yukon
Supervisor, Financial & Risk Mgt.	1	Electric Systems for non-engineers	3,651.46	OT
Supervisor, Financial & Risk Mgt.	1	Dealing with Irate Customers	269.00	Yukon
Revenue & Financial Analyst	1	Electric Systems for non-engineers	3,954.93	OT
Financial Administrator	2	Payroll update	2,291.46	OT
PT Office Administrator-Dawson	1	Supervisor I	1,000.00	Yukon
Buyer	1	Purchasing course	1,927.66	OT
Buyer	1	Public Sector Contracting	550.00	Yukon
Buyer	3	Secrets of Successful Bidding	900.00	Yukon
Buyer	1	Principals of Buying	575.00	Yukon
Assistant Buyer	1	Public Sector Contracting	550.00	Yukon
Assistant Buyer	1	Microsoft Word-correspond. course	175.00	Yukon
Corporate Services	3	Pre-Qualifying Vendor Workshop	3,659.27	Yukon
Contract Law	29	Contract Law	10,779.93	Yukon
JDE Training-Purchasing & Warehouse	7	JDE-purchasing & inventory modules	10,531.24	Yukon
		Sub-Total Finance	**45,655.83**	
Resource Dev't				
Director	1	Finance fundamentals	2,480.41	OT
		Sub-Total Resource Dev't	**2,480.41**	
Corporate Services				
Director	2	Finding, Hiring and Develop Skilled Staff	6,726.90	OT
Director	1	PowerPoint correspondence course	170.09	Yukon
Director	1	1 Athabasca correspondence course	591.59	Yukon
Administrative/HR Assistant	1	1 Athabasca correspondence course	633.00	Yukon
Administrative/HR Assistant	1	Stepping Up To Leadership	750.00	Yukon
Administrative/HR Assistant	1	1 Athabasca correspondence course	591.59	Yukon
Administrative Assistant	1	Admin course-Minute Taking	269.00	Yukon
Administrative Assistant	1	Outrageous Confidence	550.00	Yukon
Database Administ.	1	Financial Fundamentals	1,533.48	OT
Database Administ.	2	Polar Group 2003 Server Software	4,000.00	Yukon
Network Administ.	1	Exchange server	2,256.74	OT
IT Technical Support	1	Web Programming	2,845.53	OT
RRSP	20	Annual RRSP workshop	2,792.00	Yukon
Project Management	20	Project Management	23,297.96	Yukon
Powerful Presentations	10	Power Presentations	14,208.36	Yukon
Safety	10	TDG software	1,814.00	Yukon
Safety	40	Job safety planning	11,674.01	Yukon
Safety	12	St Johns First Aid	1,821.68	Yukon
Safety	1	2004 Safety training costs	599.70	Yukon
**Various Training Costs			2,096.22	Yukon
		Sub-Total Corporate Svcs	**79,221.85**	
President				
Supervisor, Communication		Electric Systems/Distrib for non-eng.	4,102.72	
		Sub-Total President & CEO	**4,102.72**	
		Grand Total	**176,951.31**	

2006 Training Costs

Department	# of Employees	Training Description	Cost	Location
				OT - Out of Territory
Engineering Services				
Director, Tech Services	3	WHMS & TDG	300.00	Yukon
Supervisor, Mechanical/Civil Engineering	1	Hydrology Workshop	2,410.29	OT
Supervisor, Electrical Engineering	1	Hydro Generator Maintenance	2,623.98	OT
Supervisor, Electrical Engineering	1	Arc Flash & Protection / Electrical Safety Training	1,847.41	OT
Electrical Engineer	1	Relay	5,449.57	OT
Distribution Technologist	1	Staking Technician Certification Program	4,962.35	OT
Civil Engineer	1	Envir. Mgt System	3,779.02	OT
Electrical Engineer	1	GE Course from 2005	60.95	Yukon
Land Technician		Achieving Your Highest Potential	445.00	Yukon
Land Technician		Engineering Plan Development	1,671.59	OT
YESA/PLC	7	Local Short Courses	1,205.50	Yukon
Technical Services	13	Monthly working lunches	1,429.09	Yukon
		Sub-Total Technical Services	**25,884.75**	
Operations				
Director	1	Transformer Diagnostics - not taken, credit with Air Canada	3,313.99	OT
Mtce Electrician	1	PSE Apprenticeship	3,341.87	OT
Mtce Electrician	1	Circuit Breaker & Switchgear Testing & Maintenance & Application Forum	1,645.49	OT
Mtce Electrician	3	Breaker Test Set Training	1,640.54	Yukon
Leadhand, Electrical	1	Arc Flash Protection & Electrical Safety Training	2,012.91	OT
Power Line Tech	1	PLT Apprenticeship	1,770.91	OT
SCC Operator	2	System Protection	6,881.11	OT
Warehouse Admin.	1	Forklift Certification	1,665.90	OT
Mtce Mechanic	1	Supervisory Level I	750.00	Yukon
Mtce Mechanic	1	Diesel Conference	2,474.99	Yukon
Mtce Mechanic	1	Practices-Maintenance & Operations	3,086.95	OT
Power Line Tech	1	Microsoft Office	125.00	Yukon
Mtce Electrician	1	Canadian Electrical Code Essentials	805.50	Yukon
Mtce Electrician	2	National Building Code Part 3	800.00	Yukon
Mtce Electrician	1	Coaching & Mentoring	1,990.00	OT
Coordinator, Property & Security	1	NRC Finance	200.00	Yukon
		Sub-Total Operations	**32,505.16**	
Finance				
CFO	2	Risk & Insurance Management Conference	4,979.46	OT
CFO	1	2006 International Risk Management Conference	3,735.40	OT
Supervisor, Financial & Risk Mgt.		CICA Handbook Accounting Refresher	1,764.64	OT
Financial Administrator	1	Payroll course	831.04	Yukon
Financial Administrator	2	Year End - Payroll Course	620.00	Yukon
Financial Administrator	1	Access	135.00	Yukon
Financial Systems Administrator	1	Advanced Excel - Vancouver	1,843.54	OT
Financial Systems Administrator	1	Conflict Resolution	329.90	Yukon
Buyer	1	Specification Writing	209.17	Yukon
Buyer	2	Laws of Agency & Employment & Competitive Bidding	1,175.00	IT
Buyer	2	Contract Administration	5,491.33	OT
		Sub-Total Finance	**21,114.48**	
Resource Planning & Regulatory Affairs				
Director		Cost of Service	5,563.78	OT
Director		Strategic Management	1,846.96	Yukon
Director		Analytical Tools	1,846.96	Yukon
		Sub-Total Resource Dev't	**9,257.70**	
HR & Information Mangement				
Director	1	Recruitment & Selection-corresp.	145.00	Yukon
Director	4	Records Mgmt Essentials	3,400.00	Yukon
Director	1	Succession Planning / Recruitment	5,510.71	OT
Director	1	Labour Relations	2,173.34	OT
HR/Records Mgmt Advisor	1	ARMA Conference	3,106.27	OT
HR/Records Mgmt Advisor	1	Workforce	2,885.96	OT
Administrative Assistant	1	Human Resource Mgmt	274.43	Yukon
Network Administ.	1	Conflict Management	350.00	Yukon
	11	Advanced Excel	1,846.78	Yukon
Supervisory	15	Leadership Challenge	6,030.96	Yukon
	15	Appropriate Workplace Conduct	813.05	Yukon
Safety	12	1st Aid	1,163.49	Yukon
Safety	19	Fall Arrest Training	6,401.60	Yukon
	10	HMI Training	15,162.82	Yukon
Safety	20	ATV & Snowmobile operations	1,092.88	Yukon
Cancelled Course Costs			687.68	Yukon
Cost recovered from City of Whitehorse for Powerful Presentations			(4,950.18)	
		Sub-Total HR & Information Management	**46,094.79**	
President				
Director, Health Safety & Environment	1	H & S Conference	1,356.74	OT
Director, Health Safety & Environment	1	Arc Flash & Protection/Electrical Safety Training	1,862.34	OT
Supervisor, Communication	1	Adobe	125.00	Yukon
Supervisor, Communication	1	Developing Satisfaction Surveys	499.00	Yukon
		Sub-Total President & CEO	**3,843.08**	
		Grand Total	**138,699.96**	

2007 Training Costs

Department	# of Employees	Training Description	Cost	Location
				OT - Out of Territory
HR & Information Management				
Database Administrator	1	Developing MS SAP.NET Web Applications	1,923	OT
Database Administrator	1	Dreamweaver	200	Yukon
HR Advisor	1	Records Management	5,938	OT
Documentation Specialist	1	CSA Workplace Electrical Safety Conference 2007	5,420	OT
		CSA Lockout - Control of Hazardous Energy	0	OT
Director HR & Information Mgmt	1	Labour Relations	1,135	OT
		Sub-Total HR & Information Management	**14,615**	
Engineering Services				
Director, Engineering Services	1	Essential Management Skills	3,639	OT
Electrical Engineer	1	Dist & Tx Line Design, NWPPA courses	3,580	OT
Electrical Engineer	1	Load Sharing & Speed Controls	3,837	OT
Draftsperson	1	Microstation V8 2D Level II	1,187	OT
Supervisor, Mech & Civil Engineering	1	Permafrost Construction, Uof A	4,030	OT
Coordinator Capital Projects	1	MS Project Comprehensive Intro	4,415	OT
Director, Engineering Services	2	Dam Safety & Inspection	420	Yukon
Electrical Engineer	2	Time Management	840	Yukon
Various	7	The Art Form of Specification Writing	490	Yukon
		Sub-Total Engineering Services	**22,438**	
Finance				
Controller	1	Leadership training (succession plan)	2,259	OT
Controller	1	IFRS - A Comparison to Canadian GAAP	1,220	OT
Supervisor, Financial & Risk Management	1	Accounting Refresher	1,194	OT
Financial Administrator	1	Dealing with Anger	350	Yukon
Buyer	1	PMAC courses	150	Yukon
Buyer	1	PMAC courses	110	Yukon
Buyer	1	Risk Management	1,853	OT
Procurement & Contract Administrator	1	A Beginner's Guide to P-Cards	118	Yukon
Procurement & Contract Administrator	1	Principals of Buying	500	Yukon
Procurement & Contract Administrator	1	Drafting Procurement Contracts	400	Yukon
Procurement & Contract Administrator	1	Law of Contracts	400	Yukon
Procurement & Contract Administrator	1	Drafting Contracts I	700	Yukon
Procurement & Contract Administrator	1	Laws of RFP's & RFQ's	1,386	OT
Procurement & Contract Administrator	1	Contract Admin for Services	104	Yukon
Procurement & Contract Administrator	1	Wellness Workshop	50	Yukon
		Canadian Payroll Association	99	Yukon
	1	2006 Training Costs	104	Yukon
	2		6,460	OT
		Sub-Total Finance	**17,455**	
President				
Manager, Environmental Assessment	1	Managing Environmental Impacts of Linear Corridors & Infrastructure	2,455	OT
		Sub-Total President	**2,455**	
Operations				
Leadhand SCC	2	Omega Lift Inc. - Equipment Orientation	1,230	OT
Leadhand, Electrical Maintenance	1	Coaching/Mentoring & Leading High Perfmance teams	1,661	OT
Maintenance Electrician	1	Level 2 Thermography Training	3,824	OT
Maintenance Electrician	1	Appretiship Training - PSE	9	Yukon
Various	4	AVTS Training	2,085	Yukon
Various	3	Class 3 to Class 1 License Upgrade	3,592	Yukon
PLT	1	Apprenticeship - PLT	5,386	OT
Director, Operations	1	Doble - Life of a Transformer	1,863	OT
Director, Operations	1	Duty to Accommodate	3,307	OT
Manager, Operations	1	Coaching & Mentoring & Guidelines for a New Manager	3,691	OT
		Sub-Total Operations	**26,649**	
Health & Safety				
Various Employees	15	First Aid	1,452	Yukon
Various Employees	12	Fall Arrest (completion of remaing employees from last year)	7,302	Yukon
Various Employees	35	Arch Flash Awareness	15,064	Yukon
Various Employees	18	Equipotenial Bonding & Grounding	7,200	Yukon
		2006 Costs	138	Yukon
		Sub-Total Health & Safety	**31,156**	
Corporate Training				
Various Employees	20	Retirement Planning & Financial Education	17,000	Yukon
Various Employees	20	Puchasing Best Practices	8,201	Yukon
Various Employees	42	SharePoint training	1,162	Yukon
Various Employees		Training Materials	1,161	Yukon
		Sub-Total Corporate	**27,524**	
		Grand-Total	**142,292**	

2008 Training Budget

Department	Training Description	# of Employees	Estimated Training Costs	Training Location
Operations				OT - Out of Territory
2 PLT's	Metering Course	2	3,900.00	OT
Leadhand, T&D	Transmission Equipotential Training	1	1,500.00	OT
Leadhand, Electrical Maintenance	Essential Management Skills	1	3,895.00	OT
Maintenance Electrician	Hands on Relay school (Basic)	1	2,485.00	OT
Leadhand, SCC	Scada User Group Meeting	1	3,395.00	OT
Maintenance Mechanic	Governor School Training	1	3,850.00	OT
Maintenance Mechanic	Governor School Training	1	3,850.00	OT
Maintenance Mechanic	Supervisor Level II	1	800.00	OT
Plant Operator	Generating Station-IPP Operators	1	2,750.00	OT
Plant Operator	Generating Station-IPP Operators	1	2,750.00	OT
Manager, Operations	Communication Skills for Managers	1	3,850.00	OT
Apprentice PLT	Powerline Technician - 3rd level	1	100.00	OT
Apprentice PLT	Powerline Technician - 1st level	1	4,000.00	OT
Apprentice PLT	Powerline Technician - 1st level	1	4,000.00	OT
Apprentice Heavy Duty Equipment Technician	Heavy Duty Equipment Technician (Off Road) 1st Level	1	4,000.00	OT
Apprentice PLT	Powerline Technician - 3rd level	1	1,000.00	OT
Apprentice, PSE	Power System Electrician-3rd level	1	4,000.00	OT
Director, Operations	Improving Asset Reliability through Operations Management	1	2,450.00	OT
	Sub-Total Operations		**52,575.00**	
Engineering Services				
Supervisor, Electrical Engineering	Leadership Skills	1	3,000.00	OT
Supervisor, Mechanical/Civil Engineering	Resource & Cost Estimating or	1	3,950.00	OT
Draftsperson	File Management/Info System	1	500.00	Yukon
Draftsperson	File Management/Info System	1	500.00	Yukon
Supervisor, Electrical Engineering	Leadership Skills	1	3,500.00	OT
Electrical Engineer	Effective Communication/Delegation	1	1,200.00	Yukon
Distribution Technician	Interpersonal Communications	1	1,200.00	Yukon
EE Department	PSS-SinCal for Engineers	7	10,250.00	Yukon
Engineering Services	Local Short Courses	10	2,500.00	Yukon
	Sub-Total Engineering Services		**26,600.00**	
HR & Information Management				
Network Administrator	Project Management-Tools & Techniques	1	950.00	Yukon
Database Administrator	Introduction to XML and Microsoft.Net Platform	1	2,950.00	OT
Network/Systems Administrator	Project Mgt for Information Systems	1	750.00	Yukon
HR Advisor	Human Resources	1	2,900.00	OT
Records Mgt Analyst	Records Management	1	2,900.00	OT
Director. HR & Information Management	Labour Relations	1	2,900.00	OT
	Sub-Total HR & Information Management		**13,350.00**	
President				
Vacant-VP Ops & ENG	Leadership or Technical	1	3,150.00	OT
Corporate Secretary	Administrative Professional Course	1	3,600.00	OT
Manager, Environment Assessment & Licensing	ISO 14001 Essentials	1	2,395.00	OT
Supervisor, Communications	How to prepare and care for museum displays	1	2,420.00	OT
Supervisor, Communications	Corel Paint Shop program - training	1	200.00	Yukon
	Sub-Total President		**11,765.00**	
Business Development				
Director, Resource Planning & Regulatory Affairs	Utility performance standards	1	2,685.00	OT
Director, Resource Planning & Regulatory Affairs	Value Analysis Seminar	1	315.00	Yukon
	Sub-Total Business Development		**3,000.00**	
Finance				
Controller	Accounting Update	1	1,628.45	OT
Controller	2007 Expenses	1	146.55	
Controller	IFRS	1	600.00	Yukon
Financial Administrator	Fundamentals of JDE	1	750.00	Yukon
Financial Administrator	Payroll Certification	1	250.00	Yukon
Financial Administrator	Taxable Benefits Seminar	1	350.00	Yukon
Financial Administrator	Fundamentals of JDE	1	750.00	Yukon
Financial Administrator	Fundamentals of JDE	1	750.00	Yukon
Financial Administrator	Pay at Work	1	200.00	Yukon
Financial Administrator	Taxable Benefits Seminar	1	350.00	Yukon
AP Clerk	Accoutning 101 & 102	1	650.00	Yukon
Sr. Office Administrator	Train the trainer course for the new CIS system (estimated time is April 2008) See Note 1	1	2,340.00	OT
Sr. Office Administrator	Training on the CIS system at the YECL office	1	3,525.00	Yukon
Office Administrator	Training on the CIS system at the YECL office	1	3,525.00	Yukon
Office Administrator	Excel training at college	1	250.00	Yukon
Supervisor, Financial & Risk Management	Fundamentals of JDE	1	750.00	Yukon
Supervisor, Financial & Risk Management	IFRS training	1	3,725.00	OT
Supervisor, Financial & Risk Management	IFRS training	1	600.00	Yukon
CFO	Cost of Service/Rate Design Training	1	1,980.00	OT
CFO	IFRS training	1	600.00	Yukon
Revenue & Financial Anaylst	Cost of Service/Rate Design Training	1	1,680.00	OT
Buyer	PMAC courses (Approved 1 course only)	1	375.00	Yukon
	Sub-Total Finance		**25,775.00**	
Health & Safety				
Manager, Health & Safety	Overview of Electrical Operations	1	1,600.00	OT
Various	Wellness Program		5,000.00	Yukon
5 employees	Air Brake Endoresement	5	500.00	Yukon
31 employees	Arc Flash Awareness Video	31	200.00	Yukon
17 employees	Audiograms	14	425.00	Yukon
6 employees	Confined Space Entry, Work & Rescue	6	540.00	Yukon
12 employees	Principles of H&S Mgt	12	1,080.00	Yukon
12 employees	Leadership for Safety Excellence	12	2,160.00	Yukon
3 employees	Auditor Training	3	540.00	Yukon
5 employees	Crane Oper (7,300 kg -13,600 kg)	5	2,500.00	Yukon
5 employees	Crane Operator (> 13,600 kg)	5	2,500.00	Yukon
6 employees	Fall Arrest – Working At Heights	6	540.00	Yukon
6 employees	JH&SC trng for new Reps	6	540.00	Yukon
24 employees	Snowmachine Operations	24	0.00	Yukon
10 employees	Standard First Aid	10	1,400.00	Yukon
60 employees	Substance Abuse Workshop	60	5,400.00	Yukon
34 employees	WHMIS	34	340.00	Yukon
	Sub-Total Health & Safety		**25,265.00**	
Corporate				
All Employees	Retirement Planning & Financial Education	40	10,700	Yukon
All Employees	Approprite Workplace Conduct	75	2,000	Yukon
5 employees	SharePoint-Train the Trainer	5	18,000	Yukon
6 employees	DRP - costs in each department	6		Yukon
Various	Contingency Fund-10% of Budget		11,820	Yukon
	Sub-Total Corporate		**42,520**	
	Total 2008 Budget		**$200,850**	

2009 Training Budget

Department	Training Description	# of Employees	Cost	Training Location
Resource Planning				OT- Out of Territory
Director, Resource Planning & Regulatory Affairs	Supply options alternatives (Geothermal, wind, solar or DSM)	1	3,500	OT
	Sub-Total Recourse Planning		**3,500**	
Finance				
CFO	CICA CFO Leadership Program	1	8,000	OT
Financial Adminstrator	CPA - Payroll Year End (last taken 2007)	1	500	Yukon
Financial Adminstrator	Advanced Excel	1	500	Yukon
Financial Adminstrator	CPA - Job Specific	1	500	Yukon
AP Clerk	Pay at work on-line training course	1	500	Yukon
Controller	Update on GAAP/IFRS	1	2,750	OT
Supervisor, Financial & Risk Management	IFRS - the next steps (anticipate a 2 day course)	1	1,900	OT
Sr. Office Administrator	Excel	1	130	Yukon
Office Adminstrator	Excel	1	130	Yukon
Revenue & Financial Analyst	Project Management	1	1,000	Yukon
Buyer or Cont Adm	Procurement	1	2,775	OT
	Sub-Total Finance		**18,685**	
HR & Information Management				
HR Advisor	Conflict Mgmt or a Supervision Course	1	500	Yukon
Director, HR & IM	HR Conference/Workshop	1	2,550	OT
Maintenance Electrician	Cisco Technician Entry	1	2,500	OT
Network/Systems Administrator	Cisco Networkers	1	3,600	OT
	Sub-Total HR & Information Management		**9,150**	
Environment				
Manager, Environment Assessment & Licensing	PMP (Project Management Professional) Certification Preparation	1	1,000	Yukon
Various	Spill Response	Various	5,000	Yukon
	Sub-Total Environment		**6,000**	
President				
Corporate Secretary	Administration /Corporate Governance	1	2,950	OT
Supervisor, Communications	Blogging - web seminar	1	300	Yukon
VP, Ops & Engineering	Leadership/Technical	1	3,500	OT
VP, Ops & Engineering	Contract Law - on-line	1	500	Yukon
	Sub-Total President		**7,250**	
Health & Safety				
Manager, H&S	Overview of Electrical Operations	1	2,200	OT
Supervisory & Managerial Staff (25)	Substance Abuse Workshop	25	3,085	Yukon
All who drive co. vehicles	Defensive Driving (*Partnering with YTG to save $$)	70	1,000	Yukon
24 employees	ATV Operations	24	5,340	Yukon
15 employees	Confined Space / Self Rescue	15	1,520	Yukon
20 employees	Standard First Aid	20	5,000	Yukon
10 employees	Crane Operator	10	5,000	Yukon
5 employees	JHSC Rep / Member Training	5	725	Yukon
All	Subscribe to online WHMIS/TDG	70	2,000	Yukon
35 employees	Medical Monitoring (audiograms, D/L medicals, etc.)	35	2,000	Yukon
	Sub-Total Health & Safety		**27,870**	
Operations				
Leadhand, Electrical Maintenance	PLC Maintenance for GE Fanuc	1	4,200	OT
Maintenance Electrician	SEL 351 R Recloser control	1	3,920	OT
Maintenance Electrician	Hands on Relay school (Basic)	1	2,485	OT
SCC Operator	SOS International - Power Starters	3	4,200	Yukon
PLT	Equipotential Grounding	2	5,900	Yukon
PLT	Training from EITI assessment?	2	6,000	OT
Maintenance Mechanic	American Governor School	1	4,245	OT
Maintenance Mechanic	Fluid Life	1	3,175	OT
Maintenance Mechanic	Class 1 Drivers License	1	2,000	Yukon
Maintenance Mechanic	Compresser Training	1	3,300	OT
Coordinator, Property & Security	Crime Prevention Through Environmental Design	1	800	Yukon
Director, Operatations	Management Training	1	2,550	OT
Manager, Operations	Management Training	1	2,550	OT
	Sub-Total Operations		**45,325**	
Engineering Services				
Supervisor, Mechanical/Civil Engineering	Resource & Cost Estimating	1	4,800	OT
Supervisor, Electrical Engineering	Leadership/Technical	1	2,550	OT
Ron Gee	CDA Dam Safety Workshop	1	2,300	OT
Draftsperson	Microstation 3D Level 1	2	4,800	OT
Director, Engineering Services	IRIS HydroGen Course or	1	3,700	OT
Electrical Engineer	Effective Communication/Delegation	1	1,200	Yukon
Electrical Engineer	Presentation Skills	1	800	Yukon
Distribution Technician	Interpersonal Communications	1	1,200	Yukon
6 Employees	MS Project Training	6	20,000	Yukon
T.S Local Training	Local Short Courses	10	2,500	Yukon
	Sub-Total Engineering Services		**43,850**	
Corporate				
Various Employees	RRSP Seminar		3,000	Yukon
Various Employees	Misc In-House short courses		1,370	Yukon
Various Employees	Office 2007 rollout		20,000	Yukon
	10% Contingency		25,000	Yukon
	Sub-Total Corporate		**49,370**	
	2009 Budget		**211,000**	

Apprenticeships

Apprentice PLT	Powerline Technician - 3rd level	2	7,000	OT
Apprentice Heavy Duty Equipment Technician	Industrial Mechanic - 1st level	1	3,500	OT
Apprentice Heavy Duty Equipment Technician	Industrial Mechanic - 2nd level	1	3,500	OT
Leadhand, Electrical Maintenance	Power System Electrician - 3rd Level	1	3,500	OT
Maintenance Electrican	Power System Electrician - 4th Level	1	3,500	OT
			21,000	

REFERENCE: **Page 3-12 line 10 through 27**

PREAMBLE:

Yukon Electrical would like to better understand employee turn over

QUESTION:

a) In the positions described from line 10 to 27 on pages 3-12 please indicate the turnover in each position since 2005 and the reasons for the turnover.

b) Please indicate, when each position was filled, and if the individual was hired locally or recruited from outside the Yukon. If the latter, please identify the moving costs associated with attracting such employees.

ANSWER:

(a) and **(b)**

Please see the table provided below.

Position Name	Hire Date	Hired From	Moving Costs ($000)	Termination Date	Reason
Documentation Specialist	23-Apr-07	Whitehorse	N/A	9-Jun-08	Relocated out of territory
Manager, Environmental Assessment & Licencing	5-Oct-07	Whitehorse	N/A	N/A	
Records Management Analyst	4-Feb-08	Whitehorse	N/A	N/A	
2 Year Term Financial Administrator	15-Jul-08	Whitehorse	N/A	N/A	
Office Administrator - increase to .8 py	1-Mar-99	Dawson City	N/A	N/A	
Manager, Operations	21-Jul-07	Outside of Territory	$35	N/A	
Vice President Operations & Engineering	10-Mar-08	Outside of Territory	$53	N/A	
Coorindator Capital Projects	4-Feb-08	Whitehorse	N/A	N/A	
Maintenance Mechanic	6-Jun-06	Whitehorse	N/A	N/A	
Apprentice Powerline Technician	7-May-07	Whitehorse	N/A	N/A	
Apprentice Powerline Technician	1-Jan-07	Mayo	N/A	N/A	
Apprentice Powerline Technician	4-Jun-07	Whitehorse	N/A	13-Jul-07	Returned to previous employer
Engineering-In-Training	16-Oct-06	Whitehorse	N/A	19-Sep-08	Extended personal leave

REFERENCE: **YEC state that an additional 100K is required in 2009 to document YEC's safety procedures with specific reference to the legal requirements of the Yukon Occupational Health and Safety Act Sections 3(1)(b), 3(1)(c) and 7(d)**

PREAMBLE:

Yukon Electrical would like to better understand to what safety standard YEC is operating under.

QUESTION:

a) Since the Occupational and Safety Act has been in effect since December of 1992, what documented procedural tools as YEC used to date, and are currently using, to meet the legal requirements of the Act?

b) To what industry standard are the newly documented safety procedures written?

c) Are these increased costs for safety / training at YEC related to Certificate of Recognition (COR) certification requirements. If so what are the specific costs of COR certification that are included in this current GRA application?

d) Please confirm if YEC is COR certified. If COR certification is not in place, please confirm when YEC anticipates COR certification will be completed.

e) What process does YEC currently use to ensure employees who work in safety sensitive positions are adequately trained and qualified?

f) Is the safety training for YEC employees available locally? Specifically where and by whom is the training provided.

g) Please provide the number of medical aid and lost time incidents experienced by YEC for each of the years 1997 to present. Please include the number of days lost per year.

ANSWER:

(a)

Yukon Energy has been using and continues to use written procedures. Yukon Energy is addressing the requirements in the Yukon's OHS Regulations, to provide written and verbal instructions to complete tasks. Factors being considered are frequency or infrequency of tasks as well as risk and hazard assessments.

(b)

Newly documented Safe Job Procedures (SJPs) conform with Yukon Worker's Compensation Health and Safety Board (YWCHSB) Occupational Health and Safety regulations, the Alberta Electrical Utility Code, CSA and utility industry best practices.

(c)

Yes, some costs are related to the Certificate of Recognition (COR) certification requirements. Specific and anticipated costs include training for employees and contracting an external auditor (estimated $7,000-10,000). See also response to YEC-YECL-1-48(a).

(d)

YEC is not currently COR certified, but anticipates such certification in the third quarter of 2009.

(e)

All workers are trained in the safe operation of equipment and processes. Workers are required to demonstrate competency including familiarity with operating instructions, procedures and safe work practices.

Lead Hands, Supervisors and Managers are also aware of their duties in respect of health and safety as set out in Yukon's OHS Act.

YEC ensures employees are adequately trained and qualified in the following ways:

- As trades and journeypersons employees each have their own specific knowledge, training and experience.

- Employee safety demonstrations review the provisions of the OH&S Act, providing employees with knowledge of and familiarity with these provisions.

- Through employee safety orientations, employees are made aware, and have knowledge of, any potential or actual danger to health or safety in the workplace.

Job-specific and new employees' training is verified through the review of training records, and orientations. Refresher training is scheduled and is documented.

Training is conducted by qualified persons.

(f)

Some safety training is available locally. Some contracted trainers include Orbis Engineering, Northern Safety Network, and Fulford Harbour (for crane operator competency assessments).

(g)

For the number of medical aid and lost time incidents experienced by YEC for each of the years 2005 (the date of YEC's last Revenue Requirement Application) to present, as well as the number of days lost, please see the table below.

Year	Medical Aids	LTA's	Days Lost
2008	**4**	**0**	**0**
2007	**2**	**0**	**0**
2006	**5**	**3**	**30**
2005	**5**	**1**	**5**

REFERENCE: **Page 7-5 & Page 9-18**

PREAMBLE:

Yukon Electrical wishes to understand differences between the application versus what is in the audited financial statements.

QUESTION:

a) Please reconcile the cost of PP&E values stated on page 7-5 line 5 with the audited financial statements on page 9-18 for the year 2007.

ANSWER:

(a)

Please see Note 2 to Schedule 8 on page 7-12 of the Application.

REFERENCE: **Page 5-15 & 5-16 Lines 26 to 31 & 1 to 17 respectively**

PREAMBLE:

Yukon Electrical would like to better understand YEC's fleet requirements and inventory.

QUESTION:

a) Please provide a comprehensive listing of all fleet and transportation equipment currently owned by YEC, please include all terrain vehicles and trailers.

b) Please provide a listing of all fleet equipment leased or rented by YEC.

c) Please provide copies of the tendering documents YEC use when purchasing fleet equipment.

d) Please provide the standards and design YEC has developed for the purchase of new service trucks with service bodies.

e) Please provide the business case for the purchase of the bucket truck in 2008 as well as the detailed specification of the truck to be purchased.

f) Please provide the business case for the purchase of the "Off Road Maintenance Vehicle" to be purchased in 2009 as well as the detailed specification of the unit to be purchased. Please provide the details on the annual lease costs for the current Nodwell supplied by Arctic Power.

ANSWER:

(a)

Please see Attachment 1 to this response.

(b)

YEC has no fleet rental or lease agreements at this time.

(c)

Please see Attachment 1 to this response.

(d)

The specification provided in response to (c) above represents Yukon Energy's standard for an electrician's service body. There are different specifications depending on the needs of the end user (e.g. electrician, mechanic, lineman, pool, etc). Each year Yukon Energy reviews the vehicles up for replacement and assesses whether the specification needs to be modified due to the changing needs of the user, available units on the market, and/or capital and operating costs.

(e)

This unit replaces a bucket truck destroyed in a roll-over accident in 2002. Since that time, crews have met this need with existing line equipment (i.e. digger truck). The higher travel between communities has increased maintenance costs on this unit; as well, it is a physically larger unit, and not well suited to accessing distribution lines within Yukon Energy served communities. Unit specifications are as follows:

2008 GMC TopKick C5500
Duramax 6.6 Diesel 330 hp
Automatic
Versalift VST 240I
Outriggers
Jib & Winch

(f)

The unit specification is provided as Attachment 1 to this response. For 2008 and 2009, the Arctic Power lease cost is $8,000/month, plus operating costs.
Please see payback analysis provided as Attachment 1 to UCG-YEC-1-84.

YUKON ENERGY CORPORATION VEHICLE/MOBILE EQUIPMENT LIST AS OF JAN 2009

UNIT #	FUEL #	PIN	YEAR	MAKE	MODEL	TYPE	SERIAL #	LOCATION
30	12460	300	1997	CHEV	CHEYENE R/C P/U	1/2 TON 2X4	1GCEC14R4VZ233796	WHITEHORSE
31	11594	310	1997	CHEV	CHEYENE R/C P/U	1/2 TON 2X4	1GCEC14R5VZ236271	WHITEHORSE
32	11595	320	1997	CHEV	CHEYENE R/C P/U	3/4 TON 2X4 CANOPY	1GCGC24RXVE268316	WHITEHORSE
33	11596	330	1998	CHEV	CHEYENE R/C P/U	1/2 TON 4X4	1GCEK14RXWZ136008	WHITEHORSE
36	11599	360	1998	CHEV	CHEYENE EXTENDED CAB	3/4 TON 4X4 S/B	1GBHK34ROWE251057	WHITEHORSE
38	11601	380	1998	DODGE	RAM P/U	1/2 TON 2X4	1B7HC16YXWS712476	WHITEHORSE
39	15351	390	1998	DODGE	RAM P/U EXTENDED CAB	1/2 TON 4X4 CANOPY	3B7HF12Z7WG211400	DAWSON
49	12494	490	1999	FORD	1999 FORD	F800	3FEXF801XXMA03653	DAWSON
51	14470	210	1998	DODGE	RAM 3500 CHASSIS	1 TON S/B EXT. CAB	1B7MC3365WJ232820	WHITEHORSE
52		520	1998	CHEV	CHEYENE CHASSIS	3/4 TON 4X4 S/B	1GCGK29R4WE239651	DAWSON
55	11583	200	1999	DODGE	RAM 2500 CHASSIS	3/4 TON 4X4 S/B EXT CAB	1B7KF23Z3XJ609133	MAYO
57	13178	570	2001	DODGE	RAM 1500 P/U	1/2 TON 4X4 EXT CAB	1B7HF13Z01J221708	WHITEHORSE
58	13179	580	2001	DODGE	RAM 1500 P/U	1/2 TON 4X4 EXT CAB	1B7HF13Z21J221709	WHITEHORSE
59	14506	260	2002	CHEV	SILVERADO 1500	1/2 TON 4X4 S/B EXT CAB	2GCEK19T421181050	WHITEHORSE
60	11585	220	2002	CHEV	SILVERADO 2500	3/4 TON 4X4 S/B EXT CAB	1GCGK29U62Z152972	WHITEHORSE
62	14331	270	2002	CHEV	SILVERADO 1500	1/2 TON 4X4 S/B EXT CAB	2GCEK19T821182590	WHITEHORSE
63	11613	630	2003	FORD	F350	1 TON 4X4 S/B EXT CAB	1FTSX31LX3ED40391	WHITEHORSE
64	11597	340	2003	DODGE	RAM 3500 CHASSIS	1 TON 4X4 EXT CAB	3D7LU38C93G825106	WHITEHORSE
65	15736	650	2004	GMC	SAFARI VAN	ALL WHEEL DRIVE	1GTDL19X54B508117	WHITEHORSE
66	11591	660	2004	CHEV	TRAILBLAZER	4X4 SUV	1GNDT13SX42434908	WHITEHORSE
67	16366	670	2006	FORD	F350	1 TON 4X4 S/B EXT CAB	1FDSX35Y56EA46953	WHITEHORSE
68	16367	680	2006	FORD	F350	1 TON 4X4 S/B EXT CAB	1FDSX35Y16EA46951	DAWSON
69	16368	690	2006	FORD	F350	1 TON 4X4 S/B EXT CAB	1FDSX35Y36EA46952	WHITEHORSE
70	16369	700	2006	FORD	F350	1 TON 4X4 S/B EXT CAB	1FDSX35Y76EA46954	WHITEHORSE
71	16333	710	2005	DODGE	RAM P/U QUAD CAB	1/2 TON 4X4	1D7HU18D35J540048	WHITEHORSE
72	16325	720	2005	DODGE	RAM P/U QUAD CAB	1/2 TON 4X4	1D7HU18D55J540049	WHITEHORSE
73	11588	730	2005	CHEV	MALIBU	4 DOOR SEDAN	1G1ZT528X5F325783	WHITEHORSE
74	16482	740	2006	FORD	F350	1 TON 4X4 S/B EXT CAB	1FDSX35Y26EB58089	MAYO
75			2007	KENWORTH	T800	CONVENT TRACTOR	1NKDLU0X17R900021	WHITEHORSE
76			2007	CHEV	SILVERADO 3500	1 TON 4X4 S/B EXT CAB	1GBJK39U57E141508	WHITEHORSE
77			2007	CHEV	SILVERADO 3500	1 TON 4X4 S/B EXT CAB	1GBJK39U37E140955	WHITEHORSE
78			2007	FORD	F350	1 TON 4X4 S/B EXT CAB	1FDSX35Y47EB20767	WHITEHORSE
79			2007	FORD	F350	1 TON 4X4 S/B EXT CAB	1FDSX35Y67EB20768	WHITEHORSE
80		800	2007	FORD	F350	1 TON 4X4 S/B EXT CAB	1FDSX35Y87EB20769	FARO
81	20578	810	2008	GMC	SIERRA 150	1/2 TON 4X4 EXT CAB	1GTEK19J28E134900	WHITEHORSE
82	20579	820	2008	CHEV	TRAILBLAZER	4X4 SUV	1GNDT13S882140414	WHITEHORSE
83	20580	830	2008	GMC	SIERRA 250	3/4 TON 4X4 EXT CAB	1GTHK29K98E141404	WHITEHORSE
84	20581	840	2008	DODGE	RAM 3500 CHASSIS	1 TON 4X4 S/B EXT CAB	3D6WH48DX8G135182	WHITEHORSE
85	20582	850	2008	FORD	F350	1 TON 4X4 S/B EXT CAB	1FDSX35508EC57986	WHITEHORSE
86		860	2008	DODGE	RAM P/U QUAD CAB	3/4 TON 4X4 EXT CAB	3D7KS28D38G238542	MAYO
87		870	2008	FORD	F150	1/2 TON 4X4 EXT CAB	1FTVX14518KF06966	WHITEHORSE
88		880	2008	GMC	TOPKICK	C5500	1GDE5C1998F400794	WHITEHORSE
89			2008	CHEV	SILVERADO 1500	1/2 TON 4X4 EXT CAB	1GCEK19C78Z300063	WHITEHORSE

UNIT #		YEAR	MAKE	MODEL	TYPE	SERIAL #	LOCATION
Nodwell		1980		TF-240	LEASED FROM ARCTIC POWER	24005578D002	WHITEHORSE
1A		1992	CUSTOM	TRAILER/SPILL RES	UTILITY	YK01508	WHITEHORSE
2A		1991	CUSTOM	TRAILER/DECK	UTILITY	YK00404	WHITEHORSE
5A		1987	CUSTOM	TRAILER	WATER	YK00684	FARO
7A		1980	RD RUNNER	TRAILER	BOAT	15688	MAYO
10A	4 WHEELER	2000	POLARIS	MAGNUM 500	4 WHEELER	4XACD50AXYA336159	DAWSON
11A		1981	FRUEHAUF	TRAILER	LOW BED (YM1)	2H8P04520BR029701	WHITEHORSE
14A		1999	ALTA. TRAILERS	TRAILER	LINE MAINT.	2T9DFYHD4X1057852	WHITEHORSE
15A		1999	HOMEMADE	TRAILER	UTILITY (SOLAR TRAILER)	102173	WHITEHORSE
16A		1999	CZ ENGINEERING	TRAILER	POLE	4CZPA2717X109F003	DAWSON
17A			JOHN DEERE	JD350 BL	BULLDOZER	180315	MAYO
19A		1999	ALUM/TEK IND.	TRAILER	MOBILE GENERATOR (YM2)	YK05257	WHITEHORSE
20A	SNOWMOBILE	2000	POLARIS	S00SD5BS	SNOWMOBILE	4XASD5BS2YC022883	FARO
21A	4 WHEELER	2000	POLARIS	AOOCD5OAB	4 WHEELER	4XACD5OA3YA317095	FARO
23A		1999	N/A	TRAILER	4 WHEELER TUB TRAILER	N/A	FARO
24A		2000	LOWE	1457 14' BOAT	BOAT	N/A	MAYO
25A	SNOWMOBILE	2001	POLARIS	550 Sport Touring	SNOWMOBILE	4XASD5BS31C147011	MAYO
26A	SNOWMOBILE	2001	POLARIS	500 Sport Touring Classic	SNOWMOBILE	4XAST4BS41C142574	DAWSON
27A	SNOWMOBILE	1994	ARCTIC CAT	CHEETAH	SNOWMOBILE	941115	WHITEHORSE
28A		1996	XINHUI CIMC	CONTAINER	STORAGE TRAILER	1AA-X050GC40	WHITEHORSE
29A		2001	MISTY RIVER	SCOUT 1600	15' BOAT	QGN46697B101	WHITEHORSE
30A		2001	EZLOADER	1250 LB.	BOAT TRAILER	71A115149	WHITEHORSE
31A		1992	WELLS CARGO	CARGO TRAILER	SUBSTATION TECH	1WC200G28N4011020	WHITEHORSE
33A		2002	CZ ENGINEERING	TRAILER	POLE	4CZPA27182110K013	WHITEHORSE
34A		1993	HYSTER	H60XL	FORKLIFT	D117B4531P	WHITEHORSE
35A		2002	TRAILTECH	TRAILER	SNOWMOBILE	2CU3F7A1422012200	WHITEHORSE
36A	4 WHEELER	2002	POLARIS	MAGNUM 500 RMK	4 WHEELER	4XACD50A12C604253	MAYO
37A	SNOWMOBILE	2003	ARCTIC CAT	MOUNTAIN CAT 600	SNOWMOBILE	4UF03SNW13T156351	WHITEHORSE
40A		2005	TRAILTECH	TRAILER	SNOWMOBILE	2CU3F7A1652018634	WHITEHORSE
42A		2006	TRAILTECH	TRAILER	SNOWMOBILE	2CU3F7A1362019175	WHITEHORSE
43A		2006	MAGNUM	TRAILER	MOBILE GENERATOR (YM3)	5AJGS16136B001493	WHITEHORSE
44A	6X6 ATV	2007	POLARIS	RANGER 6X6	6X6 ATV	4XARF68A27DO47627	WHITEHORSE
45A		2007	TRAILTECH	TRAILER/DECK	FLATDECK	2CU33ALA672023354	WHITEHORSE
46A		2008	DOUBLE A	TRAILER/DECK	FLATDECK	2DASC316X8T008597	WHITEHORSE
47A		2006	MAGNUM	TRAILER	MOBILE GENERATOR (YM4)	5AJGS11197B010532	WHITEHORSE
48A		2007	OMEGA LIFT	2414-10	FORKLIFT	OM603TWS	WHITEHORSE
49A		2008	DOUBLE A	TRAILER	SNOWMOBILE	2DAMC31418T008477	WHITEHORSE
50A	6X6 ATV	2008	POLARIS	RANGER 6X6	6X6 ATV	4XARFG8A384725237	WHITEHORSE
51A	6X6 ATV	2008	POLARIS	RANGER 6X6	6x6 ATV	4XARF68A184724037	WHITEHORSE
52A		2008	DOUBLE A	TRAILER/DECK	FLATDECK	2DAMC31418T009435	WHITEHORSE
53A	Boat/Motor	2006	ZODIAC	MK3 BOAT	XDCB296NB606	20 HP MOTOR	BMAJ1402938
54A	SNOWMOBILE	2009	SKI - DO	SKANDIC	SNOWMOBILE	YH2SFW9V99R000620	WHITEHORSE

YUKON ENERGY CORPORATION

Minimum Vehicle Specifications

Unit # 85 Spec.# YEC 2007-85

This unit is a minimum 1 ton chassis, non dual rear wheels, 4x4 extended cab complete with a minimum of three doors, with service body supplied and installed as per attached specs.

POWER TRAIN:
Engine – 8 cylinder 5.7 minimum (gas)
Transmission - Heavy duty manual, 5-speed overdrive
Shield – Transfer case
Differential – Limited Slip
Front Axle - Manufacturer's standard hubs

CHASSIS & SUSPENSION:
Shocks – Heavy duty front and rear
Stabilizer – Front
Heavy duty Transfer case
Brakes - Heavy duty power
Steering – Power
Hooks - Tow 2 front & 2 rear - SAE Rated

WHEELS & TIRES:
Vehicles having 16” tires are to be equipped with
Bridgestone 235 / 85R16 E/10P VSX
Vehicles having 17” tires are to be equipped with
BFG All Terrain T/A 285/70R17 D/8P
Vehicles having 18” tires are to be equipped with
275/65R18 Dean / Cooper sxt 10 ply
Spare- As above with rim

ELECTRICAL:
Block Heater
Dual Batteries- Heavy duty max. CCA Battery Blanket
Heavy Duty Alternator - max. amps
Radio - AM/FM / CD player
Air Conditioning
12-Volt Auxiliary Power Outlet
Wipers – Intermittent
Roof Clearance Lights
Through the roof spot light – mounted 8” from front. Sparton
Cat. #475-20 R011018 (Nor Truck Calgary (403) 250-5355

COOLING & HEATING:
-50°C Antifreeze
Heavy Duty Cooling System - engine & transmission

INTERIOR:
Color – Blue / Gray (Dark Colors)

1

Seats – Full foam padded cloth, bench, folding back, 40/20/40 split-bench, center arm rest/storage
Arm Rest – Left & right
Visor – Left & right
Heater - High output cold climate package
Mirrors - Inside center
Lamp – Dome roof mounted
Headliner – Full

EXTERIOR:

Color – Manufacturer's standard white
Mirrors – Left & right (7"x 9")

OPTIONS:

Heater – Block
Oil Pan Heater
Cruise Control
Bumper – Standard
Bumper – Rear standard step
Fuel Tank – Auxiliary/maximum capacity
2" receiver hitch with 7 pin Pollack trailer plug.

GENERAL BODY & EQUIPMENT

EDMONTON, CALGARY, SASKATOON, GRANDE PRAIRIE

APPROVED FOR PRODUCTION
Oct. 28. '05 CM

CUSTOMER: WHITEHORSE MOTORS/YUKON ENERGY
SALES/CONTACT: S. CASSELS

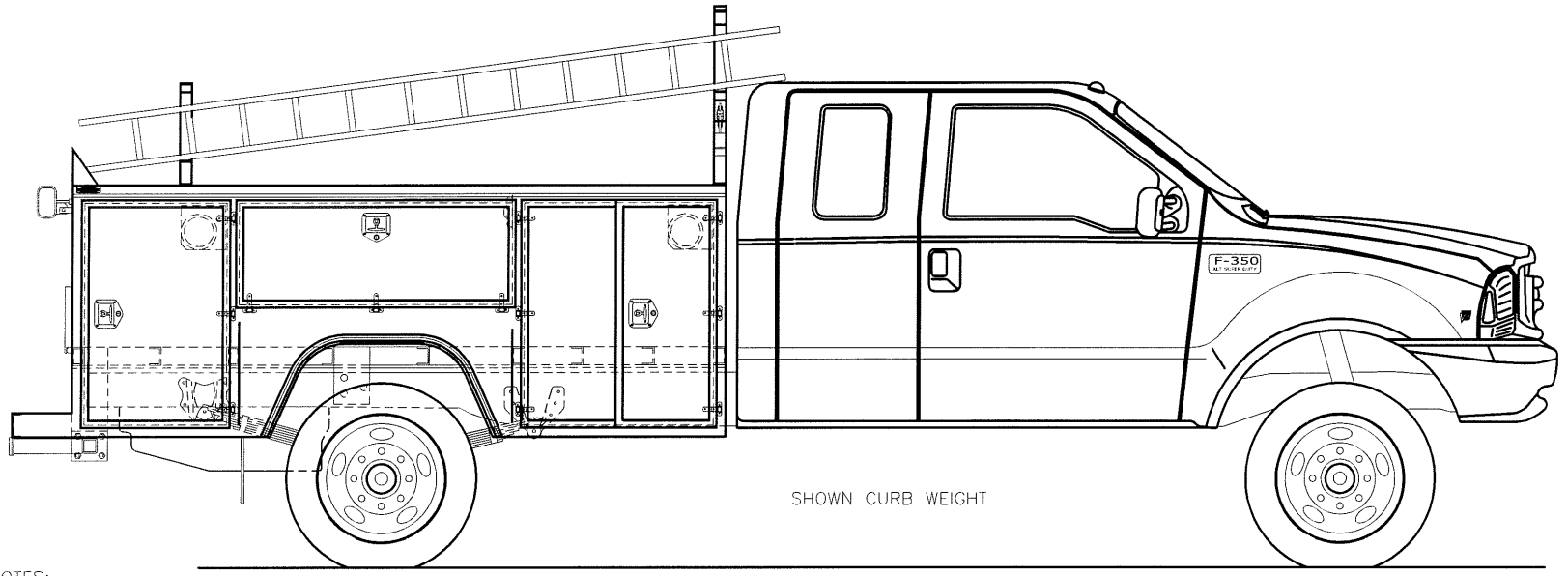
BODY DESCRIPTION: 110" SERVICE BODY
c/w LIFTMOORE L-21-7 CRANE
WORK ORDER # 31159
UNIT #

BODY MATERIAL: ALUMINUM
ASSEMBLED IN: EDMONTON

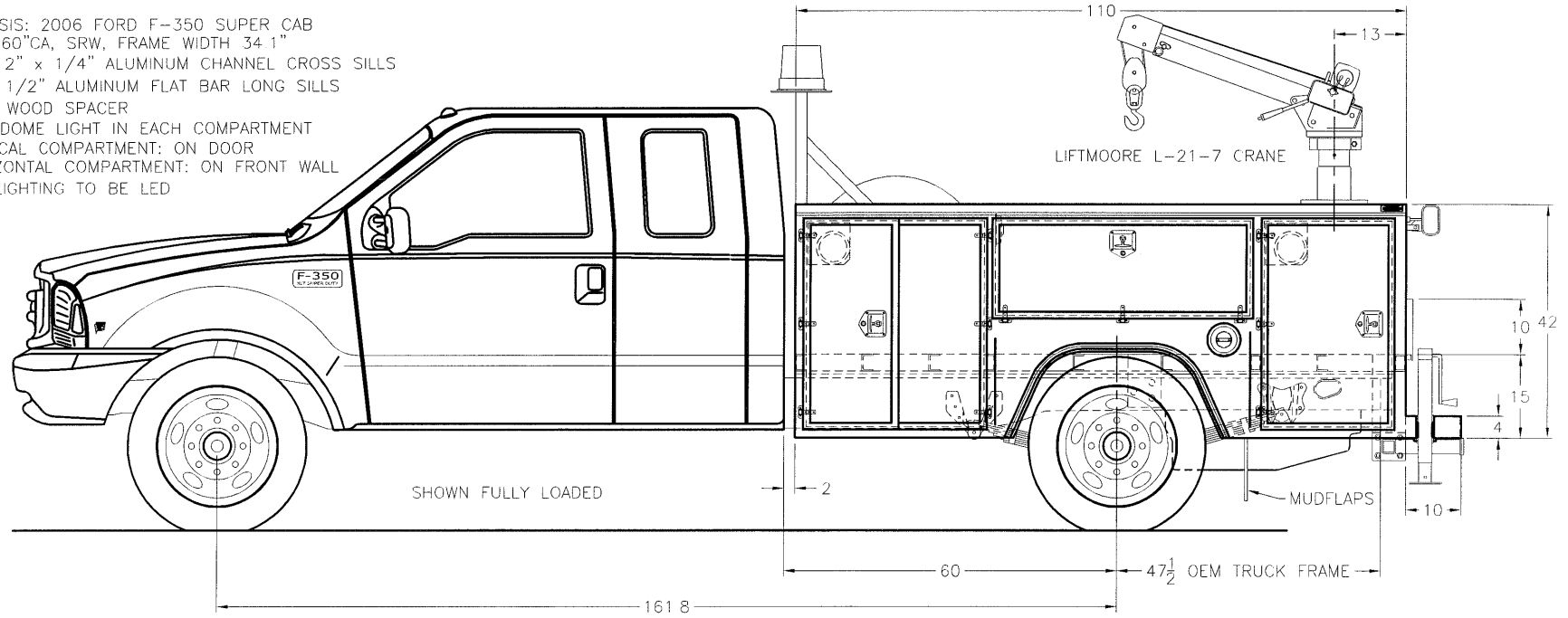
CHASSIS: 2006 FORD F-350 SUPER CAB, 4x4, 60"CA, SRW

PAGE	DESCRIPTION	DATE DRAWN	REV.	DATE ISSUED
1	BODY/CHASSIS VIEW	JUNE 7, 2005	2	OCT. 27, 2005
2	ROAD SIDE ELEVATION	JUNE 7, 2005	2	OCT. 27, 2005
3	CURB SIDE ELEVATION	JUNE 7, 2005	2	OCT. 27, 2005
4	REAR VIEW	JUNE 7, 2005	1	OCT. 27, 2005
5	PLAN VIEW	JUNE 7, 2005	2	OCT. 27, 2005
6	FLOOR DETAIL	JUNE 7, 2005	1	JUNE 27, 2005
7	FLOOR LAYOUT	JUNE 7, 2005	1	OCT. 27, 2005
8	FRONT RACK DETAIL	JUNE 7, 2005	0	JUNE 27, 2005
9-1~3	LADDER RACK DETAIL	JUNE 7, 2005	0	JUNE 27, 2005

DRAWN BY: P. GAO	CHECKED BY: C.MAILLET	APPROVED BY:	FILE: 2662TS00
DATE: JUNE 7, 2005	DATE: OCT.28, 2005	DATE:	



NOTES:
1. CHASSIS: 2006 FORD F-350 SUPER CAB 4x4, 60"CA, SRW, FRAME WIDTH 34.1"
2. 3" x 2" x 1/4" ALUMINUM CHANNEL CROSS SILLS
3. 3" x 1/2" ALUMINUM FLAT BAR LONG SILLS
4. 3/4" WOOD SPACER
5. ONE DOME LIGHT IN EACH COMPARTMENT
   VERTICAL COMPARTMENT: ON DOOR
   HORIZONTAL COMPARTMENT: ON FRONT WALL
6. ALL LIGHTING TO BE LED



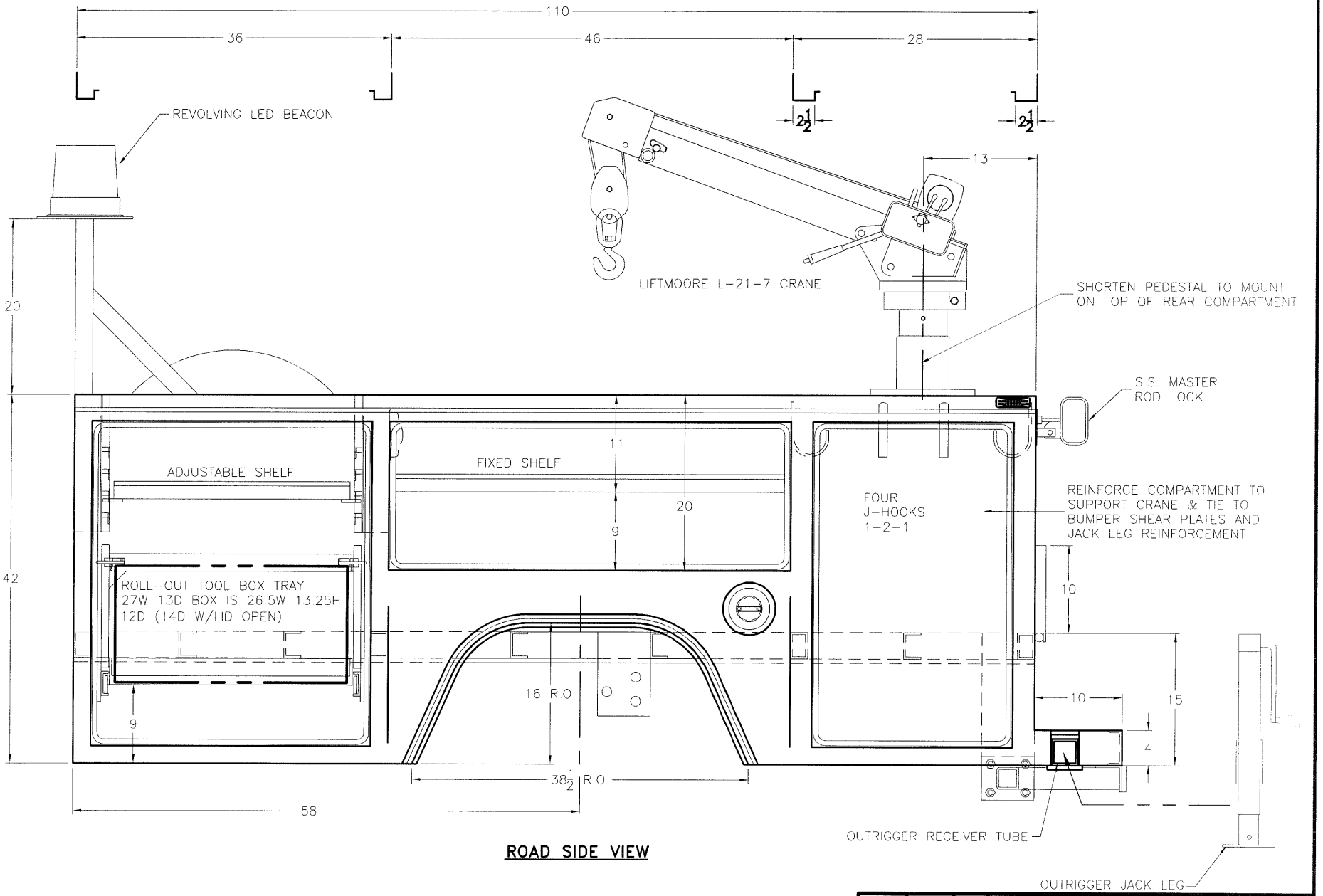
REV	DATE	BY	DESCRIPTION
2	OCT 27, 2005	C M	ADD HITCH RECEIVER
1	06/27 2005	T H	INCREASE LENGTH TO 110"

GENERAL BODY & EQUIPMENT

Customer: WHITEHORSE MOTORS/YUKON ENERGY

Date:	Scale:	Dr. By:	Ck. By:	Page#:	ACAD File:
JUNE 7, 2005	1/32	P. GAO	T. HOUNSOME	1 OF 1	2662TS00-1

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ROAD SIDE VIEW

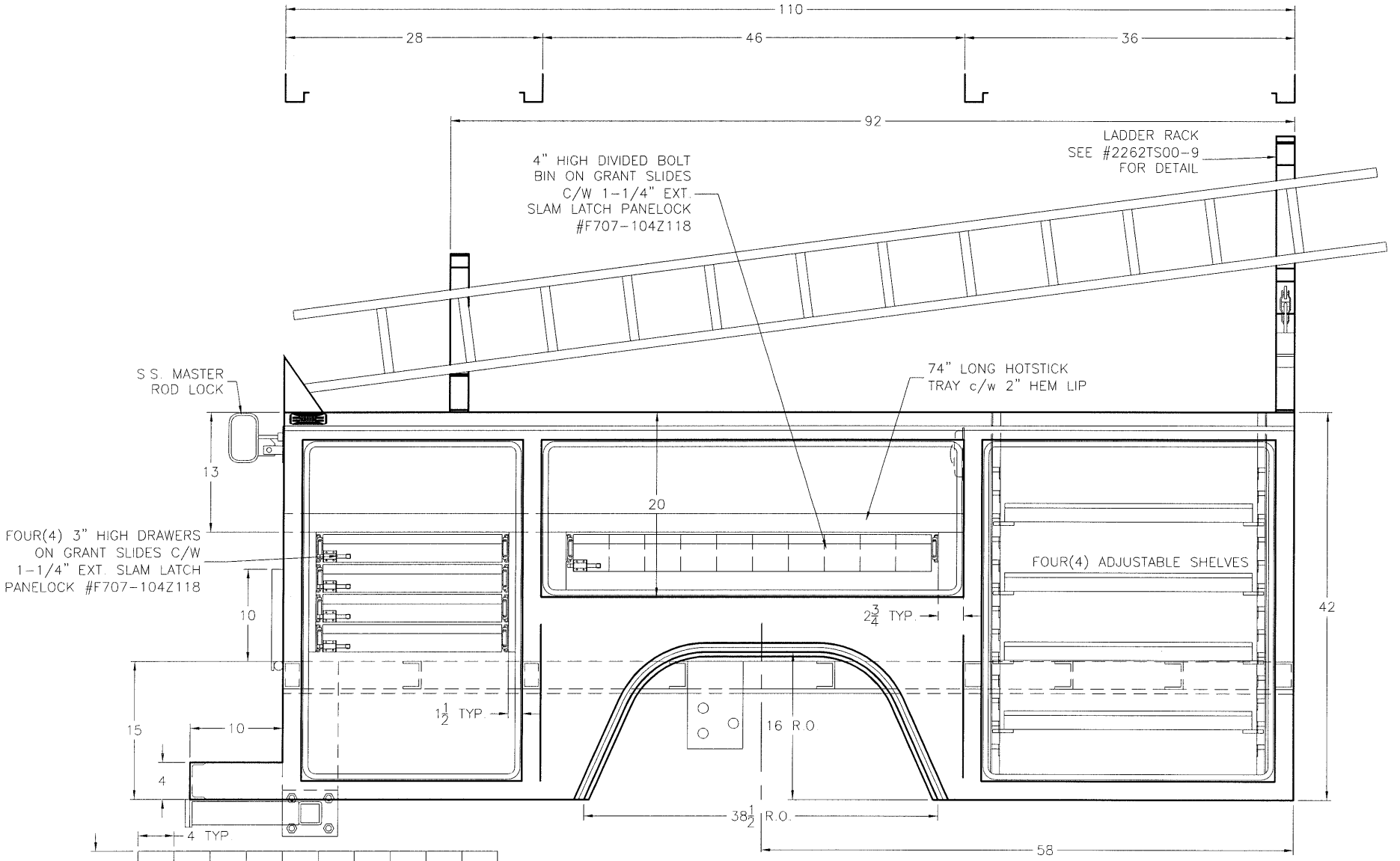
REV	DATE	BY	DESCRIPTION
2	OCT 27, 2005	C.M	ADD HITCH RECEIVER
1	06/27 2005	T.H	INCREASE LENGTH TO 110"

GENERAL BODY & EQUIPMENT

Customer: WHITEHORSE MOTORS/YUKON ENERGY

Date:	Scale:	Dr. By:	Ck By:	Page#:	ACAD File:
JUNE 7, 2005	1/16	P. GAO	T. HOUNSOME	1 OF 1	2662TS00-2

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CURB SIDE VIEW

DIVIDED BOLT BIN DETAIL

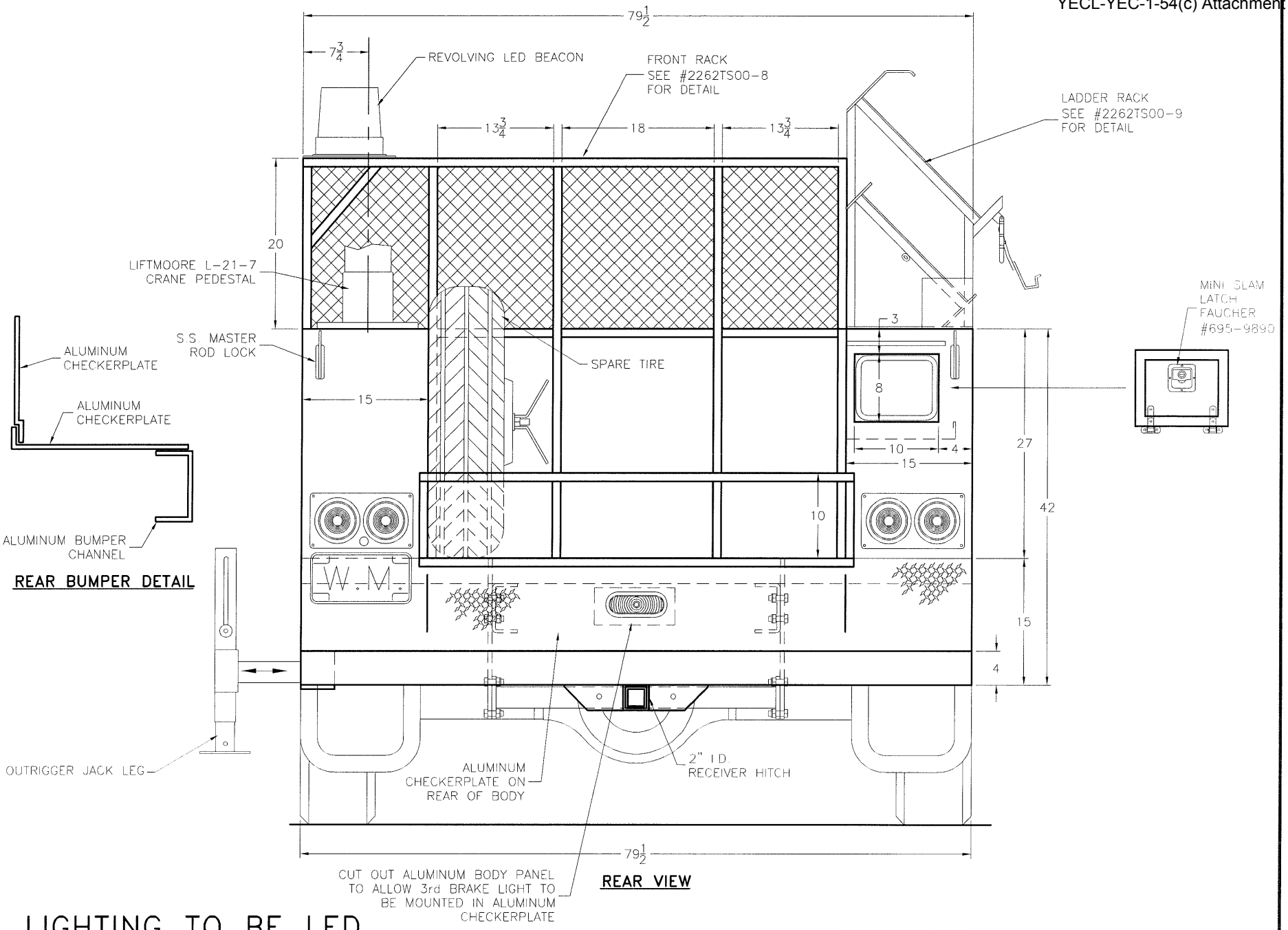
REV	DATE	BY	DESCRIPTION
2	OCT 27, 2005	C.M	ADD HITCH RECEIVER
1	06/27 2005	T.H.	INCREASE LENGTH TO 110"

GENERAL BODY & EQUIPMENT

Customer: WHITEHORSE MOTORS/YUKON ENERGY

Date:	Scale:	Dr. By:	Ck By:	Page#:	ACAD File:
JUNE 7, 2005	1/16	P. GAO	T. HOUNSOME	1 OF 1	2662TS00-3

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ALL LIGHTING TO BE LED

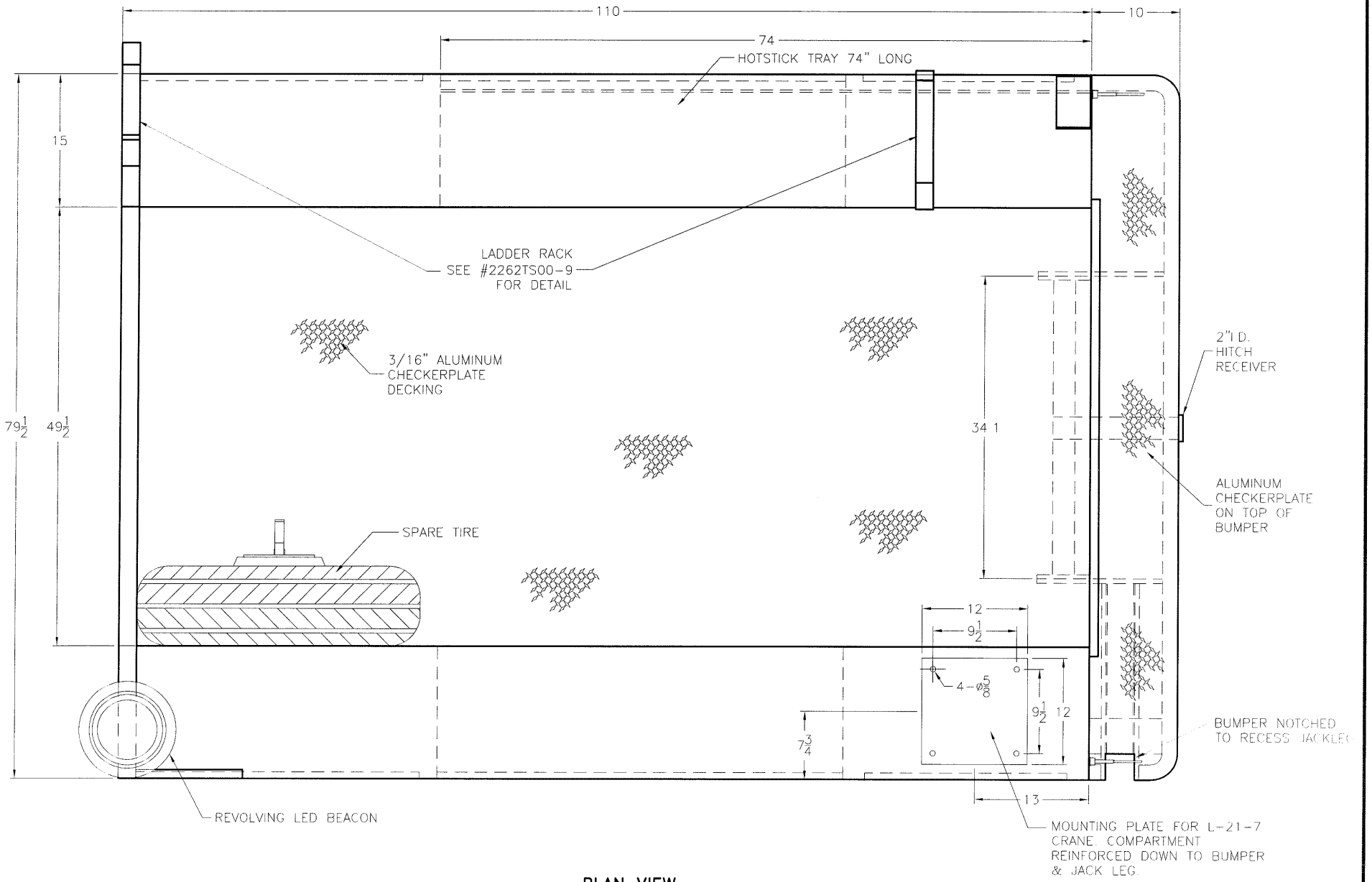
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1	OCT 27, 2005	C M	ADD HITCH RECEIVER

GENERAL BODY & EQUIPMENT

Customer: WHITEHORSE MOTORS/YUKON ENERGY

Date:	Scale:	Dr By:	Ck By:	Page#:	ACAD File:
JUNE 7, 2005	1/16	P. GAO	T. HOUNSOME	1 OF 1	2662TS00-4

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PLAN VIEW

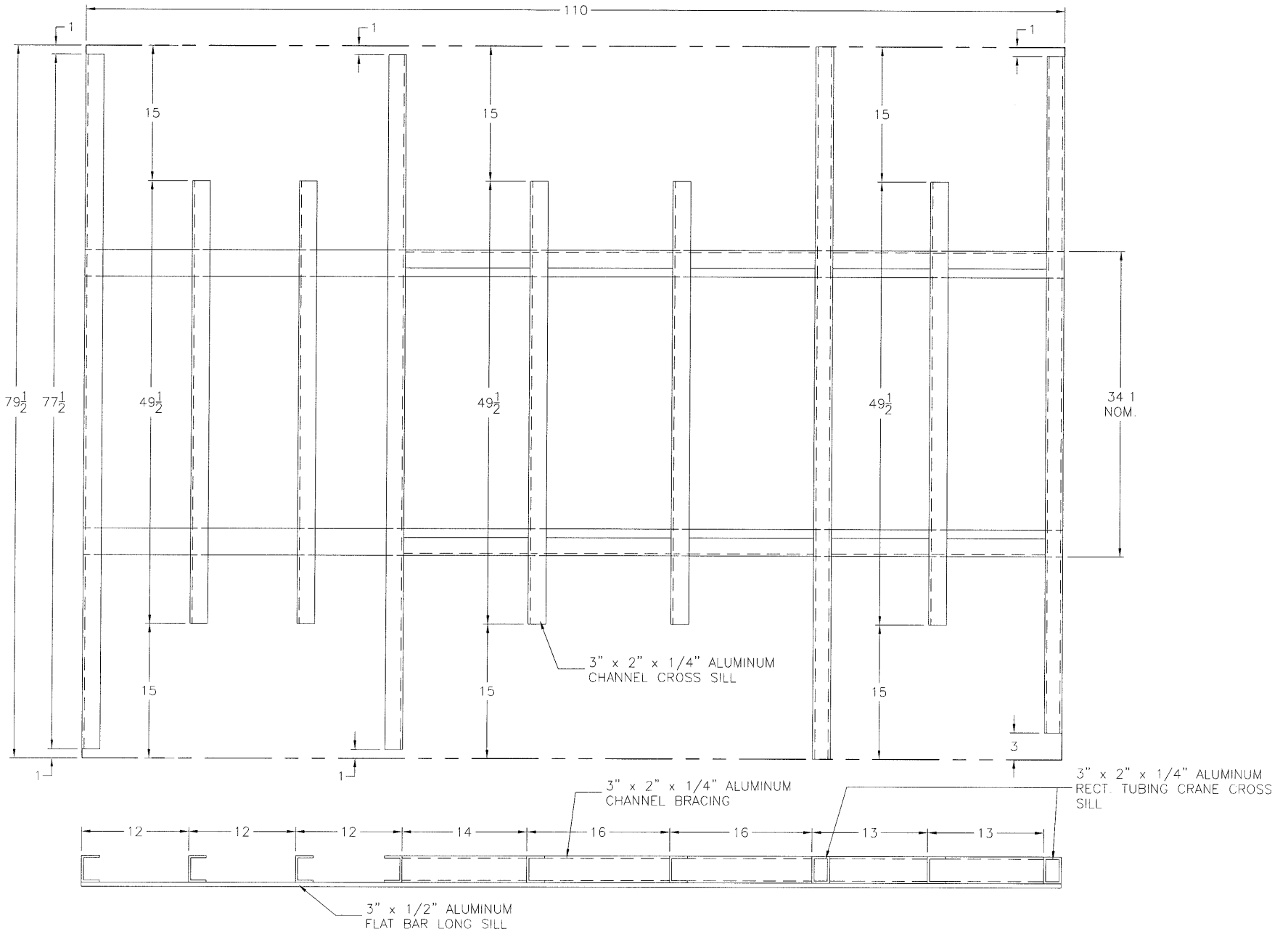
REV	DATE	BY	DESCRIPTION
2	OCT 27, 2005	C.M.	ADD RECEIVER HITCH
1	06/27 2005	T.H.	INCREASE LENGTH TO 110"

GENERAL BODY & EQUIPMENT

Customer: WHITEHORSE MOTORS/YUKON ENERGY

Date: JUNE 7, 2005 | Scale: 1/16 | Dr. By: P. GAO | Ck By: T. HOUNSOME | Page#: 1 OF 1 | ACAD File: 2662TS00-5

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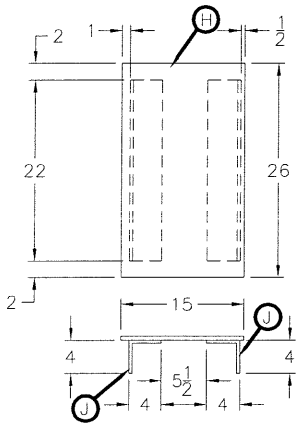
REV	DATE	BY	DESCRIPTION
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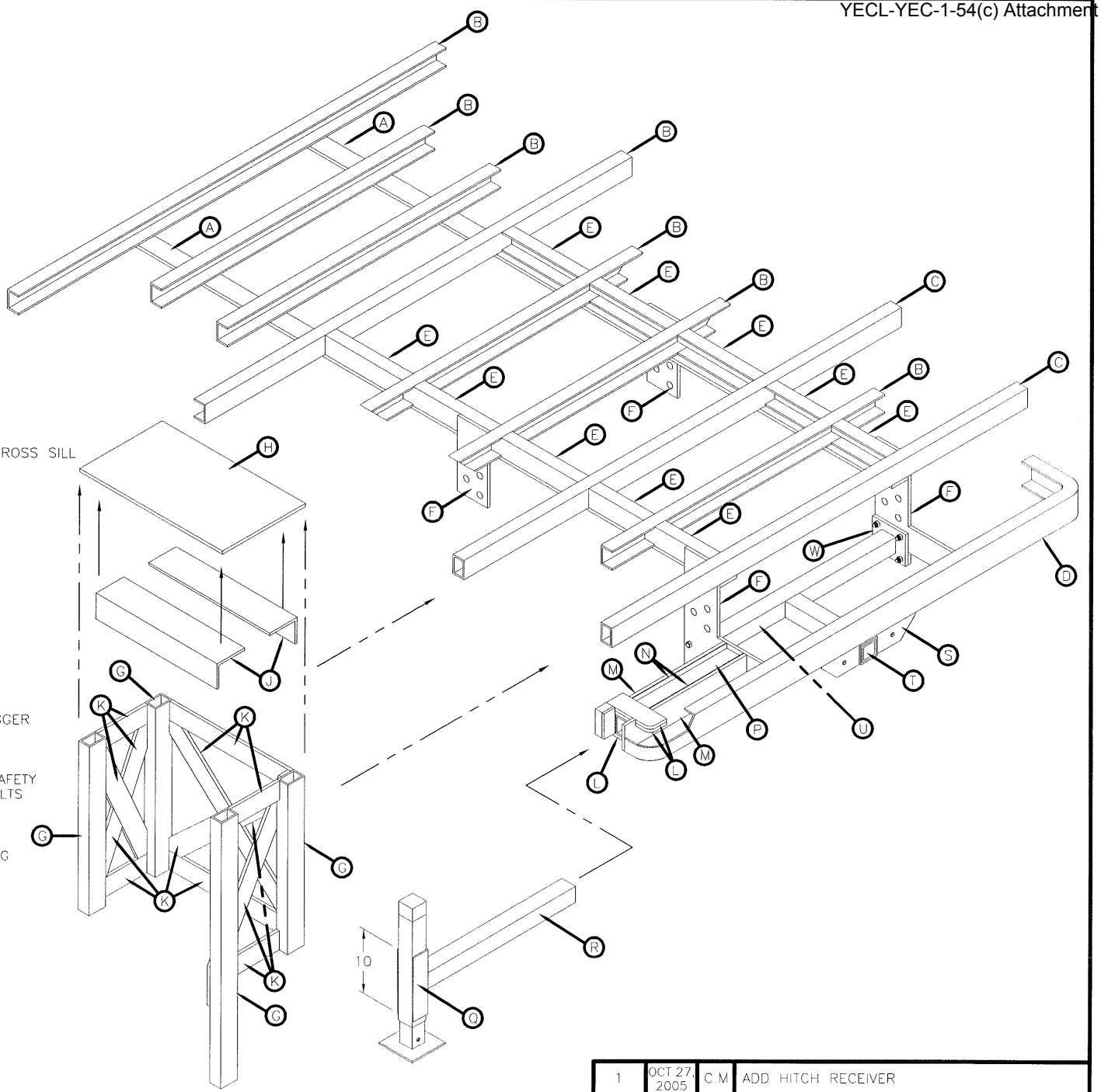
GENERAL BODY & EQUIPMENT

Customer: WHITEHORSE MOTORS/YUKON ENERGY

Date:	Scale:	Dr By:	Ck. By:	Page#:	ACAD File:
JUNE 7, 2005	1/16	P. GAO	T. HOUNSOME	1 OF 1	2662TS00-6

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- A 3" x 1/4" ALUMINUM FLAT BAR LONG SILL
- B 3" x 2" x 1/4" ALUMINUM CHANNEL CROSS SILL
- C 3" x 2" x 1/4" RECT. ALUMINUM TUBING CRANE CROSS SILL
- D 4" X 2" X 1/4" ALUMINUM BUMPER CHANNEL
- E 3" x 2" x 1/4" ALUMINUM CHANNEL BRACING
- F 6" x 1/2" ALUMINUM SHEAR PLATE
- G 3" x 2" x 1/4" RECT. ALUMINUM TUBING
- H 1/2" ALUMINUM CRANE MOUNT BASE PLATE
- J 4" x 4" x 3/8" ALUMINUM FORMED ANGLE
- K 3" x 1/4" ALUMINUM FLAT BAR BRACING
- L 3" x 1/2" ALUMINUM FLAT BAR
- M 1/2" x 4" ALUMINUM FLAT BAR
- N 1/8" ALUMINUM SHIM
- P 2-1/2" I.D. ALUMINUM OUTRIGGER RECEIVER TUBE
- Q 3/16" FORMED STEEL CHANNEL WELDED TO OUTRIGGER
- R 2-1/2" X 2-1/2" X 1/4" SQUARE STEEL TUBING
- S 3" x 2-1/2" x 1/4" STEEL ANGLE FOR MOUNTING SAFETY CHAIN HOOKS BOLTED TO ANGLE USING 1/2" DIA. BOLTS
- T 2" I.D. SQUARE STEEL TUBING HITCH RECEIVER
- U 2-1/2" x 2-1/2" O.D. x 1/4" SQUARE STEEL TUBING
- W 6" x 5" x 1/2" STEEL HITCH MOUNTING PLATE

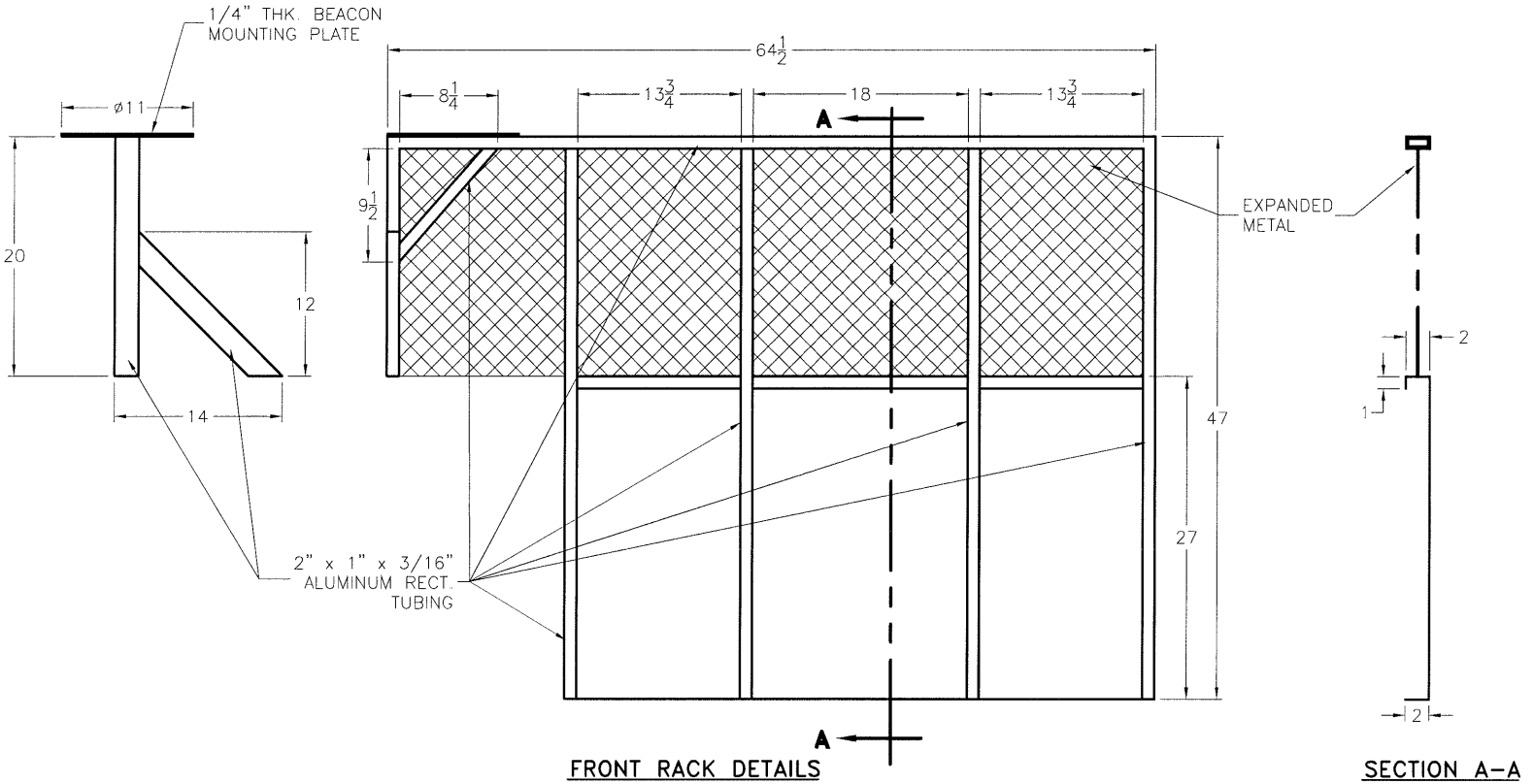
REV	DATE	BY	DESCRIPTION
1	OCT 27, 2005	C.M.	ADD HITCH RECEIVER

GENERAL BODY & EQUIPMENT

Customer: WHITEHORSE MOTORS/YUKON ENERGY

Date:	Scale:	Dr By:	Ck By:	Page#:	ACAD File:
JUNE 7, 2005	1/24	P. GAO	T. HOUNSOME	1 OF 1	2662TS00-7

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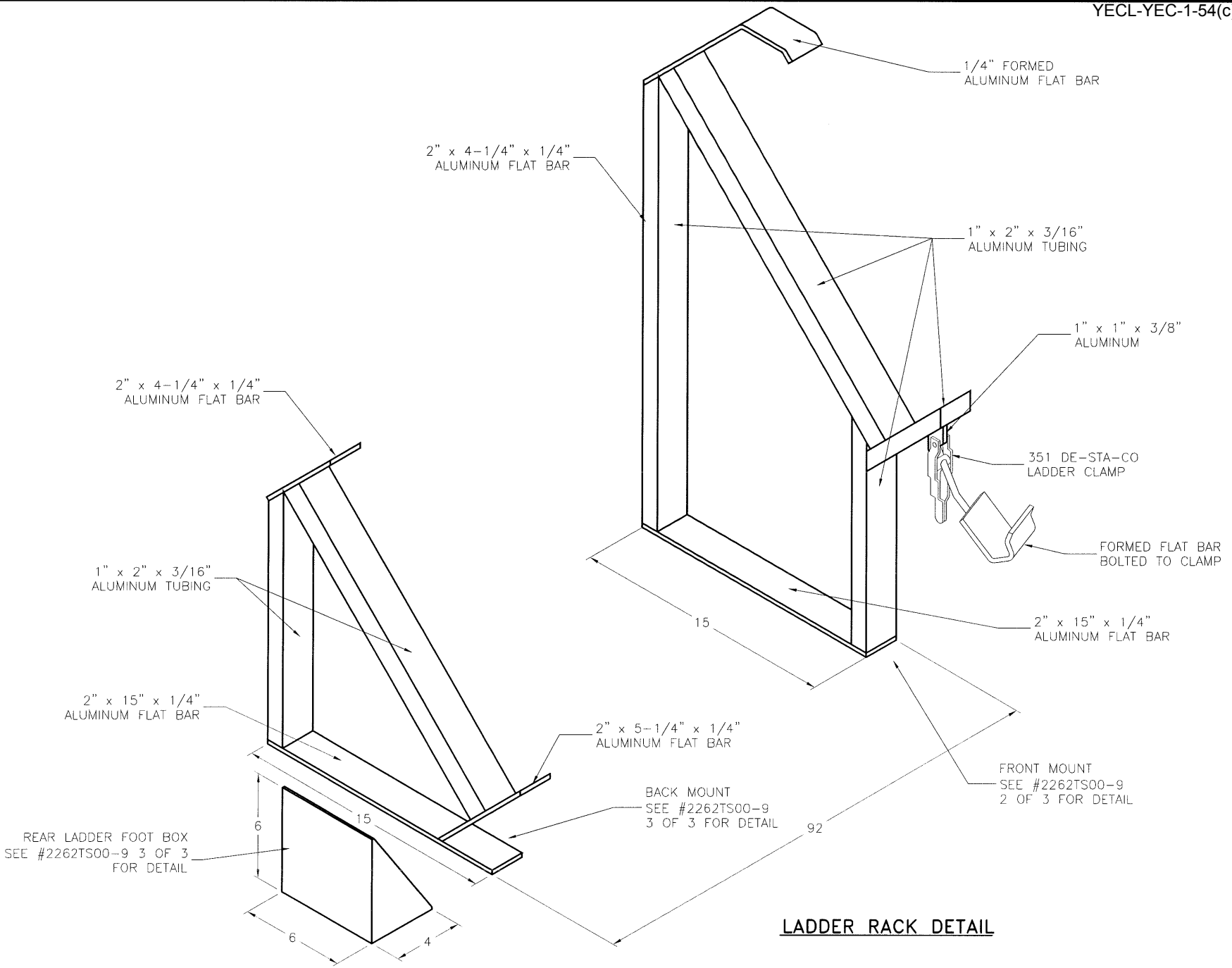


FRONT RACK DETAILS

SECTION A–A

GENERAL BODY & EQUIPMENT	Customer: WHITEHORSE MOTORS/YUKON ENERGY	REV	DATE	BY	DESCRIPTION
	Date: JUNE 7, 2005	Scale: 1/16	Dr. By: P. GAO	Ck. By: T. HOUNSOME	Page#: 1 OF 1	ACAD File: 2662TS00-8

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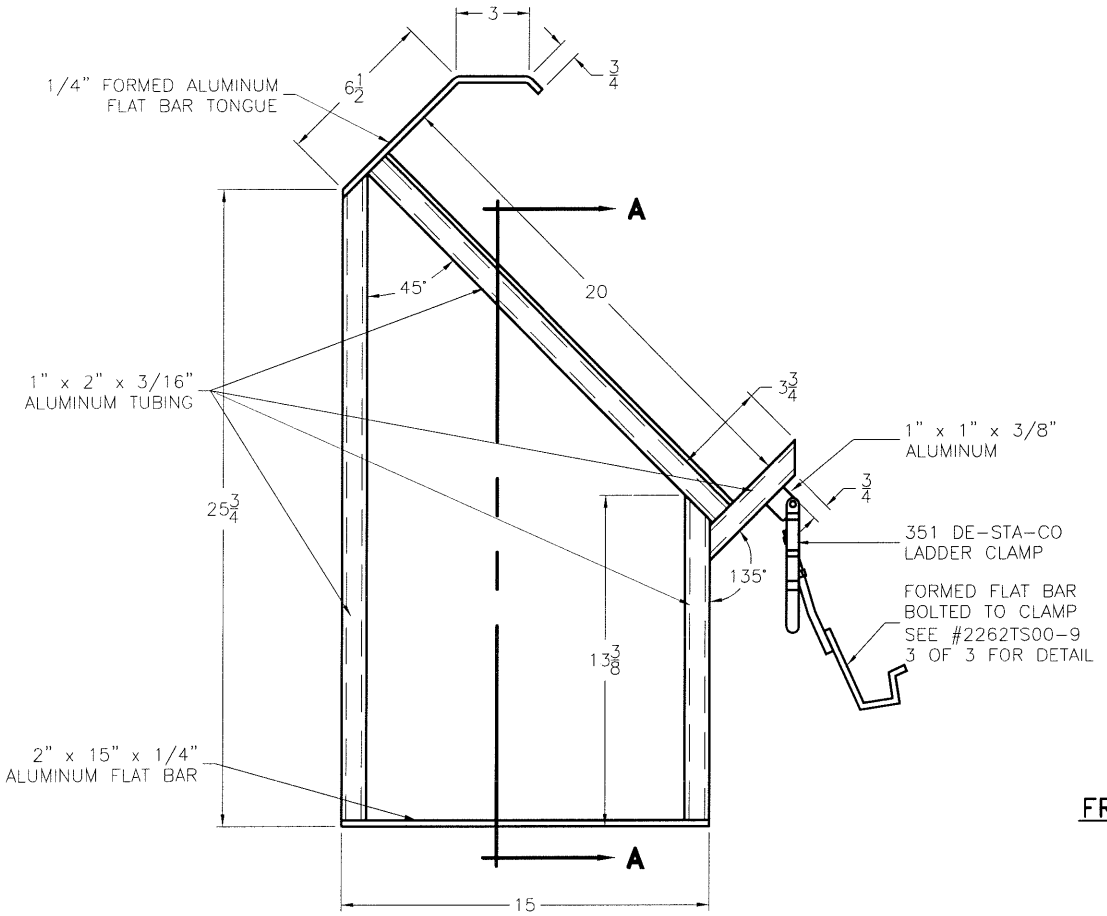


LADDER RACK DETAIL

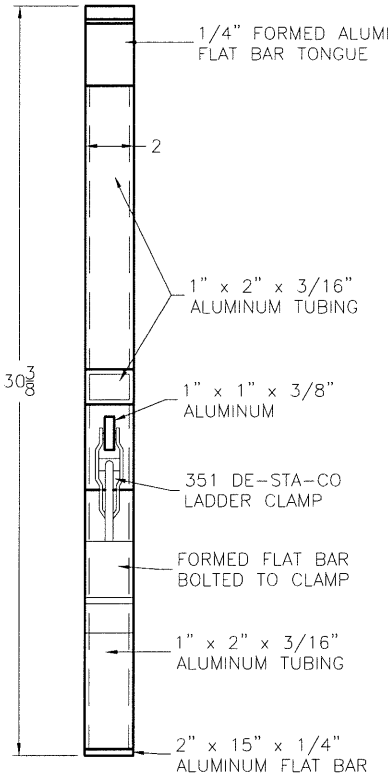
GENERAL BODY & EQUIPMENT

Customer: WHITEHORSE MOTORS/YUKON ENERGY	REV	DATE	BY	DESCRIPTION
Date: JUNE 7, 2005	Scale: 1/8	Dr By: P. GAO	Ck By: T. HOUNSOME	Page#: 1 OF 3	ACAD File: 2662TS00-9

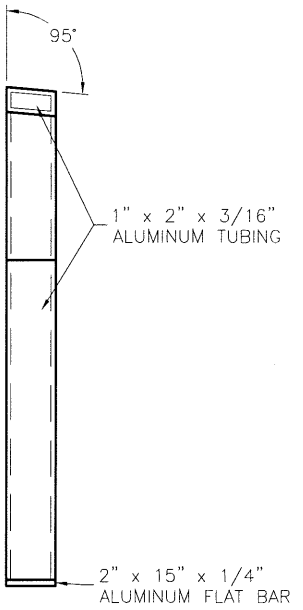
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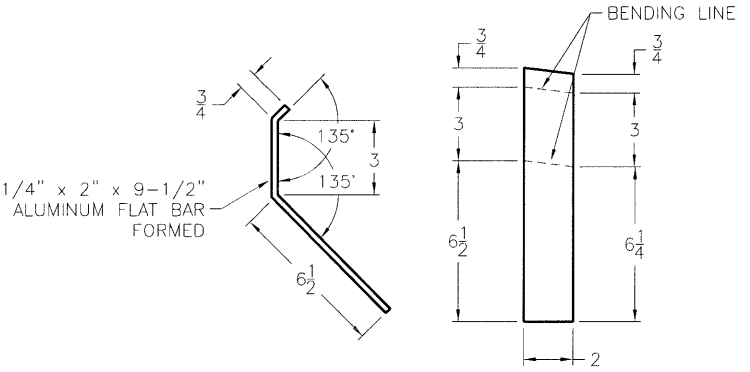
FRONT MOUNT – REAR VIEW



FRONT MOUNT – SIDE VIEW



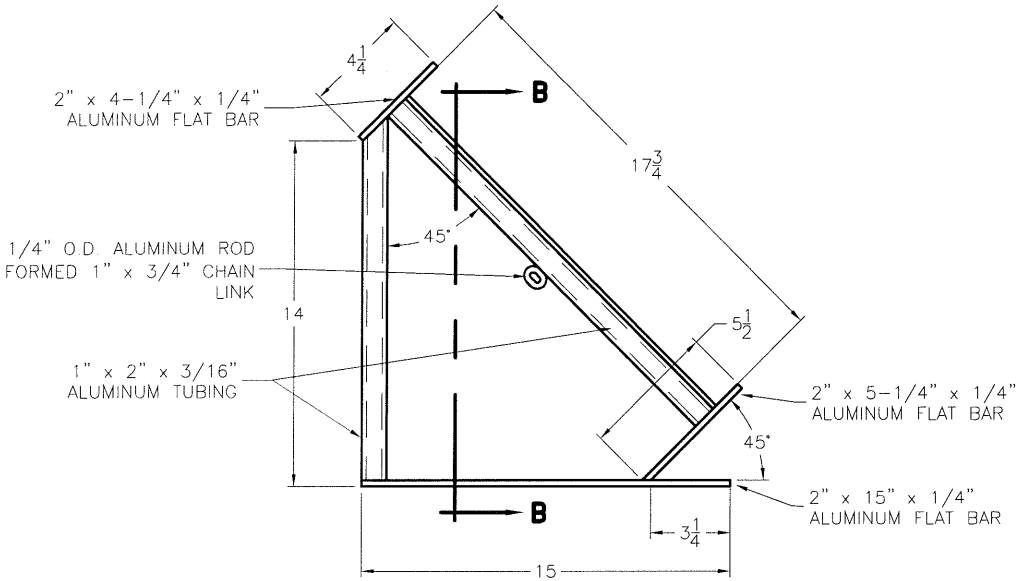
SECTION A–A



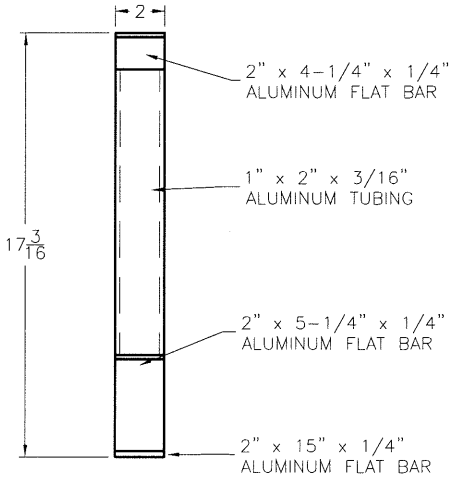
FLAT BAR TONGUE

GENERAL BODY & EQUIPMENT	Customer: WHITEHORSE MOTORS/YUKON ENERGY	REV	DATE	BY	DESCRIPTION
	Date: JUNE 7, 2005	Scale: 1/8	Dr By: P. GAO	Ck. By: T. HOUNSOME	Page#: 2 OF 3	ACAD File: 2662TS00-9

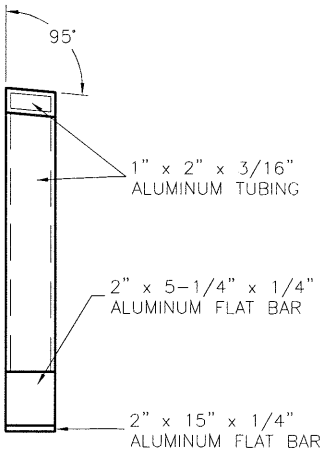
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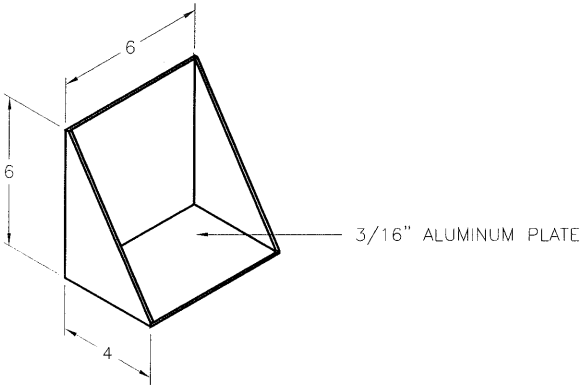
REAR MOUNT – REAR VIEW



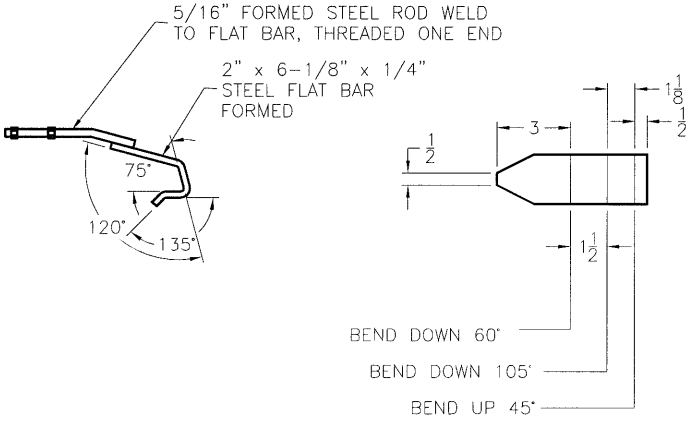
REAR MOUNT – SIDE VIEW



SECTION B–B



REAR LADDER FOOT BOX



CLAMP DETAIL

GENERAL BODY & EQUIPMENT	Customer: WHITEHORSE MOTORS/YUKON ENERGY	REV	DATE	BY	DESCRIPTION
	Date: JUNE 7, 2005	Scale: 1/8	Dr By: P. GAO	Ck By: T. HOUNSOME	Page#: 3 OF 3	ACAD File: 2662TS00-9

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TRACK INDUSTRIES LTD.

5529 3RD Street S.E.
Calgary, Alberta
T3E 1H4

Tel: 403-255-5323
Fax: 403-255-7494
Toll free: 1-888-255-5323

Wednesday, April 23,2008

CUSTOMER; Yukon Energy Corporation.

MODEL; HT-300XL

DATE; Wednesday, April 23,2008

STANDARD SPECIFICATIONS

DRIVE TRAIN

Engine:	Cummins Diesel EPA electronic engine QSC-280HP 2200 RPM Donaldson Air cleaner with precleaner and indicator Donaldson exhaust Electric throttle foot / toggle set Oil 0140 Rottela Shell Horton fan clutch Grid air heater (no ether start aid required) Espar hydronic 4 engine preheater with 7 day timer
Pump drive:	Durst 3 hole 1.23-1 ratio with 14 inch over centre clutch
Pump:	Sundstrand 90L series
Drive motors:	Rexroth 107CC variable output
Track drives:	O&K 55 series 66-1 ratio – speed 5.5 mph / 8 kms
Brakes:	Service: Hydrostatic Parking: Internal disc brakes on O&K wheel ends Hydraulic drive cooler electric with hydraulic drive fan

STEERING SYSTEM

Steering wheel

RUNNING GEAR

Tracks:	40 inch (838mm) Muskeg (D-Dent)
Track belt:	PN-240 6 ply Goodyear, 240 PSI per layer
Grouser bar:	1/2 in x 3 in (12.7mm x 76.2mm) spring steel with bolt on re-enforcing bars every bar
Traction Cleats	Re-enforcing bar with ice pick every five grouser bars
Sprocket drive:	Steel, with replaceable urethane sprockets
Sprocket idler:	Steel, with replaceable urethane sprockets
Suspension:	Heavy duty walking beams c/w urethane bushings
Hubs:	10 stud oil bath with metal face seals
Wheels:	6.50 x 20 - 10 stud heavy duty, extra re-enforcing
Tires:	8.25 x 20 Solid rubber

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CAB

TI 2 man c/w engine dog house
Acoustic lined and insulated I interior sound level max 85 dba
All welded construction
Dog house with hinged sides for access to engine compartment
Sliding door windows
Fixed rear window, defrost on rear window (heated)
ROPS certified SAE J1040 or CSA B352
3 sets of keys for doors and storage compartments, keyed alike.

Accessories:

Windshield wiper (2), 2 speed with washer
Escape hatch (2), above operator and co-driver 26" x 21"
Bucket style suspension seats (2) shock ride
Sunvisor (2) seat belts (2)
Dome light (2)
Westcoast Mirrors (2) brush protected

ELECTRICAL SYSTEM (All non functional switches removed)

System:	12 volt
Alternator:	Delco Remy 160 amp
Batteries:	2 Extra heavy duty high capacity
Headlights:	Sealed beam (2) forward on grill guard or under cab windshield visor halogen
Spot Lights	Two cab roof mounted Night Ray model 475-20
Instrument panel:	Full instrumentation: charge pressure (silicone filled) , fuel gauge, hydraulic temperature, two power point accessory outlet.
Engine monitor system:	High temperature ,low oil shutdown ,low coolant.
Hydrostatic gauges:	Roda Deaco overspeed positive air shut off electric Temperature gauge and charge pressure (silicone filled pressure gauge only)
Windshield wipers:	Two speed
Miscellaneous:	Engine block heater Deck light (2) on rear cab halogen Backup alarm (1) inside rear frame Engine preheater with 7 day timer All wire connections to be soldered and heat shrink no blade connections (screw lug only) Electrical diagnostic plug dash mount in cab Remote start studs with covers at front frame Duel electric horns Inclinometer forward aft and side function

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HEATING & COOLING SYSTEM

System:	110degrees F (38 C) ambient operating radiator assembly Chargeair cooling and radiator purge chamber
Arctic pack:	Cab heater 40,000 Btu's c/w (2) defroster fans, rear heated windows electric
Hoses:	Engine and radiator, Arctic (blue) cold weather
Antifreeze:	Ethylene Glycol to -50 degrees C, extended life coolant pre diluted to 50 I 50 mixture. Factory filled decal at radiator fill area.
Fan:	Electric clutch with manual override as indicated in engine specs.
Cooling system heater:	115 volt 1000 watt, heater cord routed to the back of cab

HYDRAULIC

Reservoir:	190-245 litre capacity (full at time of delivery) spec to carrier required capacity
Oil:	Shell synthetic customer spec with blue dye
Heater:	In tank Arctic Fox engine coolant operated * 120 volt 300 watt, heater cord routed to back of cab
Hoses:	High pressure hydraulic hoses, round shaft hangers for all hoses
Tool outlet	Two hydraulic tool outlet each side behind cab or rear deck
Filler cap:	Locking hydraulic oil fill cap

FRAME

Welded frame of high strength steel corten I double frame
Full belly pans, sealed, removable
Frame sealed for limited oil leakage from Hydrostatic system
All high pressure hydraulic hoses contained within frame tub
Front and rear tow and tie down rings, 2 front 2 rear with 2 trailer safety chain eyes
Pintle hook Buyers BP200 swivel mounted at rear frame

WINCH

30,000lbs front mounted Hydraulic operated c/w customer spec cable and tail chain.
Electrically actuated with proportional control.

BRUSH GUARD

Full brush guard to protect cab front and mirrors with front bumper to accommodate winch cable roller guide and two track mounting roller guides.

TANKS

Fuel:	350 litre aluminum, in frame Locking fuel cap

TOOLS

Track mounting tool
Wheel wrench c\w handle

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PAINT

Cab, white to match crane boom
Hydraulic tank, brushguard, filter box, battery box, tank rack. White as above
Deck, Chassis, wheels and lower frame, Black Urethane
All paint applied in accordance to standard #TS0010.

MANUALS

Three complete sets of Track Industries manuals, parts and service
(supplied in vehicle at time of delivery)
3 – Service engine and hydraulics manuals
3 – Service for carrier manuals
3 – Complete parts manuals for carrier only
Photo copies of wiring diagrams and hydraulic schematic with manuals.

Fuel, oil and antifreeze levels full at time of delivery.

Engine oil 0140 Rottela Shell
Hydraulic oil customer spec with blue dye
Antifreeze 50 I 50 mix Texaco
Windshield washer fluid
75W80 semi synthetic gear oil, torque hubs and pump drive shell customer spec

Delivery 12 months from receipt of purchase order

20% deposit required upon receipt of purchase order