

1 Q. Please provide the dates, up to and after January 11, 2013, on which Holyrood Units
2 1 and 2 backup AC (South) lube oil pumps were called on to supply adequate lube
3 oil to the turbines and state the degree to which they functioned properly.

4

5

6 A. As part of normal operations, in the event of a Holyrood Unit 1 or 2 trip, the North
7 lube oil pumps lose power along with any equipment fed from Power Centre A
8 (UAB-1) or Power Centre B (UAB-2), Units 1 and 2 respectively. Lube oil is then
9 supplied from either the backup AC (South) lube oil pumps or the DC lube oil pumps
10 (in the event the backup AC lube oil pump is unavailable) which are fed from Power
11 Centre C (SAB-12)/Diesel Bus (DB12) and DC Systems, respectively.

12

13 Table 1 identifies every Holyrood Unit 1 or 2 trip that occurred from January 1990
14 to May 2015, during which the backup lube oil pumps would have been required to
15 operate in order to safely bring the unit offline. For every unit trip other than the
16 January 11, 2013 incident, the unit was safely removed from service without
17 damage, indicating the backup lube oil pumps operated adequately.

18

19 Hydro does not maintain easily accessible data that clearly shows every incident
20 when a component of the system (i.e., AC South lube oil pump, DC lube oil pump,
21 diesel generation) operated on a component basis. Hydro does not maintain
22 records of the lube oil system operations prior to the upgrade of the Distributed
23 Control System (DCS). Further, if any greater level of detail is required, Hydro will
24 require a significant amount of time to examine the records for each of the events
25 (which are available on the DCS) listed in Table 1.

Table 1: Unit 1 and 2 Forced Outage - Sudden

Unit	Date	Lube Oil System
HRD 2	1990/01/07 8:28	Provided Adequate Lube Oil
HRD 2	1990/01/08 23:25	Provided Adequate Lube Oil
HRD 2	1990/01/12 12:24	Provided Adequate Lube Oil
HRD 2	1990/02/10 23:30	Provided Adequate Lube Oil
HRD 2	1990/02/16 5:12	Provided Adequate Lube Oil
HRD 2	1990/02/16 6:22	Provided Adequate Lube Oil
HRD 1	1990/02/25 14:07	Provided Adequate Lube Oil
HRD 2	1990/03/23 17:17	Provided Adequate Lube Oil
HRD 1	1990/04/15 19:25	Provided Adequate Lube Oil
HRD 1	1990/05/26 7:04	Provided Adequate Lube Oil
HRD 2	1990/07/16 10:45	Provided Adequate Lube Oil
HRD 1	1990/08/25 3:52	Provided Adequate Lube Oil
HRD 2	1990/10/20 2:35	Provided Adequate Lube Oil
HRD 2	1990/10/20 11:55	Provided Adequate Lube Oil
HRD 2	1990/11/25 21:15	Provided Adequate Lube Oil
HRD 2	1990/11/26 5:17	Provided Adequate Lube Oil
HRD 1	1990/12/11 11:12	Provided Adequate Lube Oil
HRD 1	1990/12/11 12:36	Provided Adequate Lube Oil
HRD 1	1990/12/11 13:40	Provided Adequate Lube Oil
HRD 1	1990/12/12 11:36	Provided Adequate Lube Oil
HRD 1	1991/01/11 15:20	Provided Adequate Lube Oil
HRD 2	1991/01/11 15:20	Provided Adequate Lube Oil
HRD 2	1991/01/25 9:23	Provided Adequate Lube Oil
HRD 2	1991/01/26 9:38	Provided Adequate Lube Oil
HRD 1	1991/02/12 9:21	Provided Adequate Lube Oil
HRD 2	1991/03/07 1:02	Provided Adequate Lube Oil
HRD 2	1991/03/07 18:09	Provided Adequate Lube Oil
HRD 1	1991/03/12 8:28	Provided Adequate Lube Oil
HRD 2	1991/03/12 8:28	Provided Adequate Lube Oil
HRD 2	1991/04/01 13:57	Provided Adequate Lube Oil
HRD 1	1991/04/08 21:31	Provided Adequate Lube Oil
HRD 2	1991/04/18 9:03	Provided Adequate Lube Oil
HRD 2	1991/04/18 10:44	Provided Adequate Lube Oil
HRD 2	1991/04/18 20:29	Provided Adequate Lube Oil
HRD 1	1991/07/01 23:34	Provided Adequate Lube Oil
HRD 1	1991/07/06 19:28	Provided Adequate Lube Oil

Unit	Date	Lube Oil System
HRD 1	1991/07/06 23:40	Provided Adequate Lube Oil
HRD 2	1991/09/08 4:06	Provided Adequate Lube Oil
HRD 2	1991/09/08 17:18	Provided Adequate Lube Oil
HRD 2	1991/09/11 9:45	Provided Adequate Lube Oil
HRD 2	1991/09/29 8:45	Provided Adequate Lube Oil
HRD 2	1991/10/01 19:04	Provided Adequate Lube Oil
HRD 2	1991/10/05 17:46	Provided Adequate Lube Oil
HRD 1	1991/11/03 22:01	Provided Adequate Lube Oil
HRD 1	1991/11/04 20:16	Provided Adequate Lube Oil
HRD 1	1991/11/12 15:14	Provided Adequate Lube Oil
HRD 2	1991/12/10 13:51	Provided Adequate Lube Oil
HRD 2	1991/12/10 16:28	Provided Adequate Lube Oil
HRD 2	1991/12/13 9:32	Provided Adequate Lube Oil
HRD 2	1992/01/06 9:03	Provided Adequate Lube Oil
HRD 2	1992/01/08 15:54	Provided Adequate Lube Oil
HRD 2	1992/01/22 11:02	Provided Adequate Lube Oil
HRD 1	1992/02/19 23:00	Provided Adequate Lube Oil
HRD 1	1992/04/07 23:04	Provided Adequate Lube Oil
HRD 1	1992/04/08 2:56	Provided Adequate Lube Oil
HRD 1	1992/04/08 8:51	Provided Adequate Lube Oil
HRD 1	1992/04/08 11:36	Provided Adequate Lube Oil
HRD 2	1992/04/08 11:36	Provided Adequate Lube Oil
HRD 1	1992/04/08 15:09	Provided Adequate Lube Oil
HRD 1	1992/04/08 16:17	Provided Adequate Lube Oil
HRD 1	1992/04/08 21:31	Provided Adequate Lube Oil
HRD 1	1992/04/09 10:55	Provided Adequate Lube Oil
HRD 1	1992/04/09 13:30	Provided Adequate Lube Oil
HRD 1	1992/04/09 14:25	Provided Adequate Lube Oil
HRD 1	1992/04/09 15:05	Provided Adequate Lube Oil
HRD 1	1992/04/09 20:42	Provided Adequate Lube Oil
HRD 1	1992/04/09 21:38	Provided Adequate Lube Oil
HRD 2	1992/04/10 9:30	Provided Adequate Lube Oil
HRD 2	1992/04/12 15:44	Provided Adequate Lube Oil
HRD 2	1992/05/15 4:24	Provided Adequate Lube Oil
HRD 2	1992/07/01 8:00	Provided Adequate Lube Oil
HRD 2	1992/09/27 23:21	Provided Adequate Lube Oil
HRD 1	1992/10/06 21:42	Provided Adequate Lube Oil
HRD 2	1992/12/19 22:31	Provided Adequate Lube Oil

Unit	Date	Lube Oil System
HRD 2	1992/12/28 10:57	Provided Adequate Lube Oil
HRD 2	1993/02/22 9:14	Provided Adequate Lube Oil
HRD 2	1993/02/25 14:10	Provided Adequate Lube Oil
HRD 1	1993/06/21 15:10	Provided Adequate Lube Oil
HRD 2	1993/09/08 0:45	Provided Adequate Lube Oil
HRD 2	1993/09/18 19:32	Provided Adequate Lube Oil
HRD 1	1993/10/02 12:56	Provided Adequate Lube Oil
HRD 2	1993/10/02 13:07	Provided Adequate Lube Oil
HRD 1	1993/10/03 2:33	Provided Adequate Lube Oil
HRD 1	1993/10/27 10:08	Provided Adequate Lube Oil
HRD 1	1993/10/27 12:02	Provided Adequate Lube Oil
HRD 1	1993/10/27 13:17	Provided Adequate Lube Oil
HRD 2	1993/10/29 16:15	Provided Adequate Lube Oil
HRD 2	1993/12/20 14:11	Provided Adequate Lube Oil
HRD 1	1993/12/22 11:32	Provided Adequate Lube Oil
HRD 2	1993/12/22 23:00	Provided Adequate Lube Oil
HRD 1	1994/01/21 21:31	Provided Adequate Lube Oil
HRD 1	1994/03/05 4:10	Provided Adequate Lube Oil
HRD 1	1994/03/17 15:20	Provided Adequate Lube Oil
HRD 1	1994/10/15 15:15	Provided Adequate Lube Oil
HRD 2	1994/11/16 18:40	Provided Adequate Lube Oil
HRD 1	1994/12/09 1:41	Provided Adequate Lube Oil
HRD 1	1994/12/10 13:27	Provided Adequate Lube Oil
HRD 2	1994/12/10 13:27	Provided Adequate Lube Oil
HRD 1	1995/04/06 11:31	Provided Adequate Lube Oil
HRD 2	1995/09/07 14:35	Provided Adequate Lube Oil
HRD 2	1995/09/07 17:37	Provided Adequate Lube Oil
HRD 1	1995/11/01 22:44	Provided Adequate Lube Oil
HRD 1	1995/11/02 6:17	Provided Adequate Lube Oil
HRD 1	1995/11/20 13:43	Provided Adequate Lube Oil
HRD 1	1995/11/20 15:33	Provided Adequate Lube Oil
HRD 2	1995/11/23 0:37	Provided Adequate Lube Oil
HRD 2	1995/11/23 2:20	Provided Adequate Lube Oil
HRD 1	1995/11/25 23:40	Provided Adequate Lube Oil
HRD 2	1995/12/11 21:27	Provided Adequate Lube Oil
HRD 2	1995/12/11 23:29	Provided Adequate Lube Oil
HRD 2	1995/12/30 15:34	Provided Adequate Lube Oil
HRD 1	1996/02/16 14:00	Provided Adequate Lube Oil

Unit	Date	Lube Oil System
HRD 2	1996/02/18 5:50	Provided Adequate Lube Oil
HRD 2	1996/04/19 12:50	Provided Adequate Lube Oil
HRD 2	1996/05/18 18:26	Provided Adequate Lube Oil
HRD 2	1996/06/07 9:11	Provided Adequate Lube Oil
HRD 2	1996/06/07 13:57	Provided Adequate Lube Oil
HRD 2	1996/10/02 16:25	Provided Adequate Lube Oil
HRD 2	1996/10/22 8:02	Provided Adequate Lube Oil
HRD 1	1996/11/07 1:51	Provided Adequate Lube Oil
HRD 2	1996/11/07 1:52	Provided Adequate Lube Oil
HRD 1	1997/02/27 9:27	Provided Adequate Lube Oil
HRD 1	1997/09/18 7:20	Provided Adequate Lube Oil
HRD 1	1997/12/08 9:35	Provided Adequate Lube Oil
HRD 2	1997/12/08 9:35	Provided Adequate Lube Oil
HRD 1	1998/03/04 10:36	Provided Adequate Lube Oil
HRD 1	1998/04/04 7:07	Provided Adequate Lube Oil
HRD 2	1998/04/04 7:07	Provided Adequate Lube Oil
HRD 1	1998/04/17 10:04	Provided Adequate Lube Oil
HRD 2	1998/05/22 18:00	Provided Adequate Lube Oil
HRD 2	1998/10/27 7:32	Provided Adequate Lube Oil
HRD 1	1998/11/12 11:28	Provided Adequate Lube Oil
HRD 2	1998/11/18 14:20	Provided Adequate Lube Oil
HRD 2	1999/02/01 14:57	Provided Adequate Lube Oil
HRD 1	1999/02/04 2:20	Provided Adequate Lube Oil
HRD 1	1999/03/15 21:58	Provided Adequate Lube Oil
HRD 2	1999/05/11 14:17	Provided Adequate Lube Oil
HRD 1	1999/07/13 14:00	Provided Adequate Lube Oil
HRD 1	2000/01/28 6:26	Provided Adequate Lube Oil
HRD 1	2000/03/07 21:59	Provided Adequate Lube Oil
HRD 1	2000/03/08 5:43	Provided Adequate Lube Oil
HRD 1	2000/05/16 16:00	Provided Adequate Lube Oil
HRD 2	2000/10/25 13:36	Provided Adequate Lube Oil
HRD 2	2001/05/11 23:30	Provided Adequate Lube Oil
HRD 2	2001/09/04 9:29	Provided Adequate Lube Oil
HRD 2	2001/09/19 9:59	Provided Adequate Lube Oil
HRD 1	2001/09/30 22:51	Provided Adequate Lube Oil
HRD 1	2001/10/06 16:11	Provided Adequate Lube Oil
HRD 2	2001/10/15 11:26	Provided Adequate Lube Oil
HRD 1	2001/11/04 9:04	Provided Adequate Lube Oil

Unit	Date	Lube Oil System
HRD 1	2001/11/14 8:24	Provided Adequate Lube Oil
HRD 1	2001/12/01 8:58	Provided Adequate Lube Oil
HRD 1	2002/01/14 11:50	Provided Adequate Lube Oil
HRD 1	2002/03/27 22:17	Provided Adequate Lube Oil
HRD 2	2002/04/26 16:15	Provided Adequate Lube Oil
HRD 2	2002/05/18 5:29	Provided Adequate Lube Oil
HRD 2	2002/06/28 0:09	Provided Adequate Lube Oil
HRD 1	2003/01/30 9:59	Provided Adequate Lube Oil
HRD 2	2003/01/30 10:56	Provided Adequate Lube Oil
HRD 2	2003/02/20 12:20	Provided Adequate Lube Oil
HRD 2	2003/10/02 15:58	Provided Adequate Lube Oil
HRD 2	2003/11/21 18:41	Provided Adequate Lube Oil
HRD 2	2003/12/23 19:20	Provided Adequate Lube Oil
HRD 2	2003/12/23 20:59	Provided Adequate Lube Oil
HRD 2	2004/02/20 9:16	Provided Adequate Lube Oil
HRD 2	2004/03/07 22:05	Provided Adequate Lube Oil
HRD 1	2004/10/07 12:33	Provided Adequate Lube Oil
HRD 1	2004/10/17 10:51	Provided Adequate Lube Oil
HRD 1	2004/12/21 15:53	Provided Adequate Lube Oil
HRD 2	2006/01/06 9:32	Provided Adequate Lube Oil
HRD 2	2006/01/25 21:05	Provided Adequate Lube Oil
HRD 1	2006/05/08 7:56	Provided Adequate Lube Oil
HRD 1	2006/11/29 13:00	Provided Adequate Lube Oil
HRD 2	2006/11/30 15:30	Provided Adequate Lube Oil
HRD 1	2007/04/17 11:30	Provided Adequate Lube Oil
HRD 1	2007/06/19 13:37	Provided Adequate Lube Oil
HRD 1	2007/11/26 12:29	Provided Adequate Lube Oil
HRD 1	2007/12/02 21:12	Provided Adequate Lube Oil
HRD 1	2007/12/28 14:36	Provided Adequate Lube Oil
HRD 1	2008/01/24 10:07	Provided Adequate Lube Oil
HRD 1	2008/10/28 7:04	Provided Adequate Lube Oil
HRD 1	2009/03/05 5:15	Provided Adequate Lube Oil
HRD 1	2009/03/30 16:00	Provided Adequate Lube Oil
HRD 2	2009/03/31 15:07	Provided Adequate Lube Oil
HRD 1	2009/10/04 6:09	Provided Adequate Lube Oil
HRD 2	2009/11/06 19:41	Provided Adequate Lube Oil
HRD 1	2009/12/04 22:30	Provided Adequate Lube Oil
HRD 2	2010/01/15 14:26	Provided Adequate Lube Oil

Unit	Date	Lube Oil System
HRD 2	2010/04/22 9:56	Provided Adequate Lube Oil
HRD 2	2010/10/22 8:00	Provided Adequate Lube Oil
HRD 1	2011/05/12 17:12	Provided Adequate Lube Oil
HRD 1	2012/01/14 13:15	Provided Adequate Lube Oil
HRD 2	2012/01/14 13:15	Provided Adequate Lube Oil
HRD 1	2012/05/02 19:30	Provided Adequate Lube Oil
HRD 1	2012/10/09 10:38	Provided Adequate Lube Oil
HRD 1	2012/10/17 19:15	Provided Adequate Lube Oil
HRD 2	2012/11/07 8:38	Provided Adequate Lube Oil
HRD 2	2012/11/21 14:38	Provided Adequate Lube Oil
HRD 2	2012/11/25 11:24	Provided Adequate Lube Oil
HRD 1	2012/11/26 7:02	Provided Adequate Lube Oil
HRD 1	2013/01/11 6:40	Failed to Provide Adequate Lube Oil
HRD 2	2013/01/11 6:40	Provided Adequate Lube Oil
HRD 2	2013/01/12 3:00	Provided Adequate Lube Oil
HRD 2	2013/01/12 5:42	Provided Adequate Lube Oil
HRD 2	2013/04/16 11:35	Provided Adequate Lube Oil
HRD 2	2013/04/16 19:11	Provided Adequate Lube Oil
HRD 1	2013/05/04 12:00	Provided Adequate Lube Oil
HRD 1	2013/10/10 11:25	Provided Adequate Lube Oil
HRD 1	2013/11/29 18:15	Provided Adequate Lube Oil
HRD 1	2014/01/04 9:05	Provided Adequate Lube Oil
HRD 2	2014/01/04 9:05	Provided Adequate Lube Oil
HRD 1	2014/01/04 21:34	Provided Adequate Lube Oil
HRD 1	2014/01/05 21:30	Provided Adequate Lube Oil
HRD 2	2014/01/05 21:30	Provided Adequate Lube Oil
HRD 2	2014/01/10 18:56	Provided Adequate Lube Oil
HRD 1	2014/01/27 16:50	Provided Adequate Lube Oil
HRD 2	2014/09/17 0:08	Provided Adequate Lube Oil
HRD 2	2014/10/13 15:38	Provided Adequate Lube Oil
HRD 2	2014/11/15 16:20	Provided Adequate Lube Oil
HRD 2	2014/12/19 8:50	Provided Adequate Lube Oil
HRD 1	2015/01/22 11:56	Provided Adequate Lube Oil
HRD 1	2015/01/25 11:30	Provided Adequate Lube Oil
HRD 1	2015/03/11 10:20	Provided Adequate Lube Oil
HRD 1	2015/05/10 7:00	Provided Adequate Lube Oil

1 PR-PUB-NLH-200 Attachment 1 graphically represents the transfer of lube oil supply
2 from the primary sources to the secondary sources to maintain adequate flows for
3 a sample event (i.e., Unit 2 trip on December 19, 2014 at 08:50). The four trends
4 displayed are defined just above the graph with their ID tags in the DCS, description
5 and value at the time that the cursor (vertical line) is centred on, 08:49:30 on
6 December 19, 2014 in this case.

7
8 Between 08:49:00 and 08:50:00 Unit 2 tripped, which removed power from the
9 north AC lube oil pump (blue line). As soon as the DCS detected that there was no
10 lube oil pump running, both the AC south (yellow line) and the DC lube oil pumps
11 (red line) were started. The pump status is a digital signal (on/off), so the reader will
12 only see a step change on the graph, described in note 1 at the bottom.

13
14 The last trend, lube oil pressure (green) shows the changes in lube oil pressure
15 (supply), during the trip. The lowest value recorded during the trip is at the cursor
16 with a value of 105.23 kPa.

17
18 The scale on the left side of the graph is for the lube oil pressure and is not used to
19 read the values of the pump status.

System Process 08:45 2015-09-03 Local Application Startup

2015-09-03 08:48

CHANGE ENV

PRINT

PREVIOUS

MAIN MENU

CTRL STN

UNIT IND

TRD & BOILER

TOTAL & COM

B & W TEMP

WTR & POLISH

TAG OUT

BOILER GRP

TURBINE GRP

REPORTS

STANDARD

FUEL TANKS

UNIT 2 LUBE OIL PRESS TEST TREND

BOILER IND



NOTE:

1) The AC (NORTH & SOUTH) & DC Oil Pumps are ON with a state change from "0" to "1" for specified pump.

0 — 1 (AC OR DC OIL PUMP ON) 1 — 0 (AC OR DC OIL PUMP OFF)

2) Trend is to be printed for weekly Turbine and Auxiliary weekly check sheet.

3) Trend is to be printed on Start-Up Test.

4) Trend is to be printed on Shut-down Test.

5) Refer to Work Method and or Procedure