

ILRAS Working Group

December 6, 2007

Reliable **Power**

Reliable **Markets**

Reliable **People**



Alberta Load Shed Programs



Service	Description	Commercial Terms	Comments
LSS	<ul style="list-style-type: none"> Automatically tripped when AIES frequency drops to 59.5 Hz or below when Alberta is already islanded or the BC Tie trips at high import levels. Many be manually curtailed to restore contingency reserves. Armed all the time 	<ul style="list-style-type: none"> LSS is competitively procured. LSS is generally used in combination with ILRAS load to increase import levels on the BC tie. One LSS load may also be manually curtailed when all available TMR-contracted generation has been used and minimum operating limits still cannot be maintained in the GP area. 	<ul style="list-style-type: none"> Need is 130 MW – defined by islanded operation and loss of largest Alberta generator. Both ILRAS and LSS are currently categorized as AS. LSS customers demand is often variable.
ILRAS	<ul style="list-style-type: none"> Prevent operation of Under Frequency Load Shed (UFLS) blocks for single contingency event at high import levels. Armed as needed 	<ul style="list-style-type: none"> ILRAS is currently provided by FORTIS. ILRAS may be armed to increase import ATC for supply shortfall (reliability) or commercial conditions. 	<ul style="list-style-type: none"> Need is 240 MW – defined by the frequency response at maximum import at lowest expected AIL. Potential for technical requirements for ILRAS to be similar

Alberta Load Shed Programs



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UFLS	<ul style="list-style-type: none"> • AESO (WECC criterion) must implement an automatic UFLS relay scheme to preserve system security/arrest frequency decay. • This is a safety net for system disturbances. (i.e. significant loss of generation in WECC) 	<ul style="list-style-type: none"> • Compliance with WECC criteria is mandatory for the AESO. • AESO ensures that AIES control area is compliant (1/3 of the total load must be armed). • All UFLS customers receive a credit as per AESO Tariff. • AESO Tariff requires UFLS customers to equip at least 50 % of their load for UFLS. 	<ul style="list-style-type: none"> • DFO's currently carry the AIES obligation. • UFLS is a technical requirement specified in the interconnection requirements and new industrial customers have agreed to participate in the UFLS program.
Brazeau Fast Ramp	<ul style="list-style-type: none"> • Always armed and intended to prevent the time-delayed under-frequency blocks from operating following system disturbances. • Triggered when frequency is 59.5 HZ for 1.5 seconds 	<ul style="list-style-type: none"> • Commercial terms are negotiated. 	<ul style="list-style-type: none"> • There is only one provider of this service.

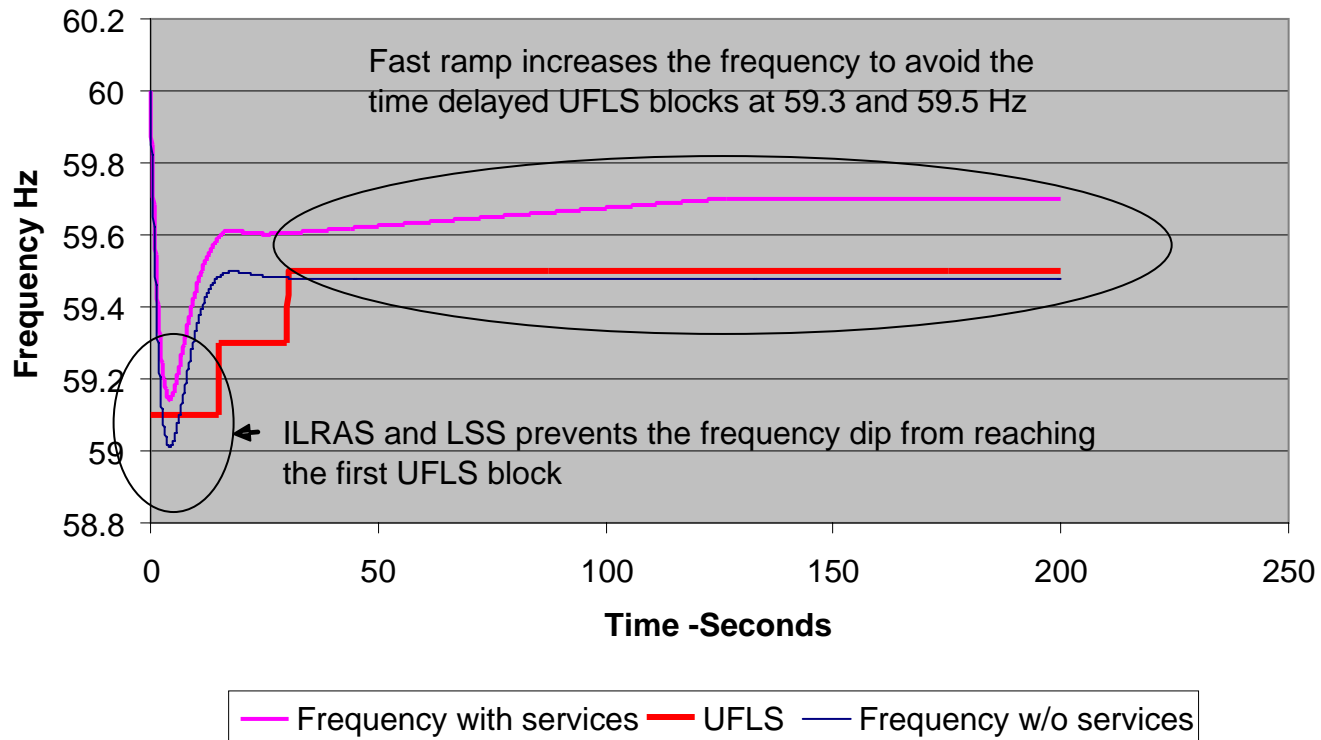
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Supply Shortfall procedures	<ul style="list-style-type: none"> The AESO may direct the DFO/TFOs to shed load during supply shortfall conditions. 	<ul style="list-style-type: none"> Depending on the amount of notice provided, load may be manually shed by service staff or automatically via SCADA control No compensation is provided. 	<ul style="list-style-type: none"> Section 18 of T Reg requires AESO to develop a load shedding protocol to ensure that industrial and commercial customers are shed first during supply shortfall conditions.
Transmission constraints	<ul style="list-style-type: none"> The AESO may direct the TFOs and DFOs to curtail load to deal with transmission constraints. Likely to occur following transmission contingencies 	<ul style="list-style-type: none"> It is condition of interconnection for the customer and outlined in the Tariff No compensation is provided. 	
RAS	<ul style="list-style-type: none"> RAS's are employed where operator action can not be taken to deal with system or transmission constraints. RAS's may be used to mitigate low probability / high consequence contingencies 	<ul style="list-style-type: none"> These are outlined in confidential OPP 704. It is condition of interconnection for the customer. No compensation is provided. 	<ul style="list-style-type: none"> Some RAS's are temporary and may be removed contingent with transmission system changes (load growth or transmission configuration changes). A RAS need might also be created through system gen and load growth without a corresponding tx increase

Pictorial View of Frequency Mitigation

Illustrative Frequency Behavior with and without ILRAS, LSS and Fast Ramp



Historical ILRAS Usage



Year	ILRAS Load Armed		ILRAS Load Curtailed	
	Hours	Average MW	Hours	Average MW
1998	NA	NA	-	-
1999	NA	NA	<1	120
2000	NA	NA	-	-
2001	NA	NA	-	-
2002	252 (Note 1)	107 (Note 1)	-	-
2003	209 (Note 1)	112 (Note 1)	-	-
2004	316	110	-	-
2005	532	114	<1	220
2006	403	116	-	-
2007 to Jul 31	2 (Note 2)	180	-	-

History of WECC Events 1994-2001



date	Pacific Prevailing Time	Pre-Dist Freq	Max Freq Dev	Post-Dist Freq	MW Lost	Unit(s) Lost	Control Area	date	MW Lost
17-Jan-94	4:31 AM	60.004	59.249		3860	Navajo, Four Corners, Corette, Jim Bridger, Naughton, Dave Johnston, Encina, Ormond Beach	ALL	17-Jan-94	3860
03-Aug-94	5:53 PM	60.000	59.867		1500	GM Schrum, Kemano	BCH	03-Aug-94	1500
05-Aug-94	2:33 AM	60.000	59.700		2000	Colstrip #1 + #2 + #3 + #4	MPC	05-Aug-94	2000
15-Oct-94	11:51 AM	60.000	59.692		2000	Colstrip #1 + #2 + #3 + #4	MPC	15-Oct-94	2000
30-Nov-94	2:14 PM	60.000	59.868		1600	Revelstoke #1 + #2 + #3 + #4	BCH	30-Nov-94	1600
14-Dec-94	12:26 AM	60.000	59.000		5000	Islanding	ALL	14-Dec-94	5000
27-Jan-95	3:00 PM	60.000	59.900		1600	Intermountain #1 + #2	LADWP	27-Jan-95	1600
06-Feb-96	8:23 AM	60.000	59.960		1600	Intermountain #1 + #2	LADWP	06-Feb-96	1600
25-Feb-96	7:17 PM	60.000			2600	Palo Verde #1 + #3	APS	25-Feb-96	2600
26-Aug-97	12:37 AM	60.000			1920	Colstrip #2 + #3 + #4	MPC	26-Aug-97	1920
31-Aug-98	1:52 PM	59.968	59.755	59.890	1766	Colstrip #1 + #3 + #4	MPC	31-Aug-98	1766
28-Apr-99	8:24 PM	59.990	59.777	59.885	1770	Colstrip #2 + #3 + #4	MPC	28-Apr-99	1770
26-Jul-99	3:02 PM	59.997	59.941	59.944	1611	Grand Coulee & Chief Joseph	BPA	26-Jul-99	1611
25-Dec-99	3:40 PM	59.992	59.776	59.890	1926	Four Corners #1 + #2 + #3 + #4 + #5	APS	25-Dec-99	1926
01-Apr-00	11:37 PM	60.015	59.778	59.898	1755	Colstrip #2 + #3 + #4	MPC	01-Apr-00	1755
24-Nov-00	6:19 AM	59.997	59.790	59.885	1845	Colstrip #1 + #3 + #4	MPC	24-Nov-00	1845