Suncor MacKay River
2010 ERCB Performance Presentation
Commercial Scheme Approval No. 8668

October 21st, 2010

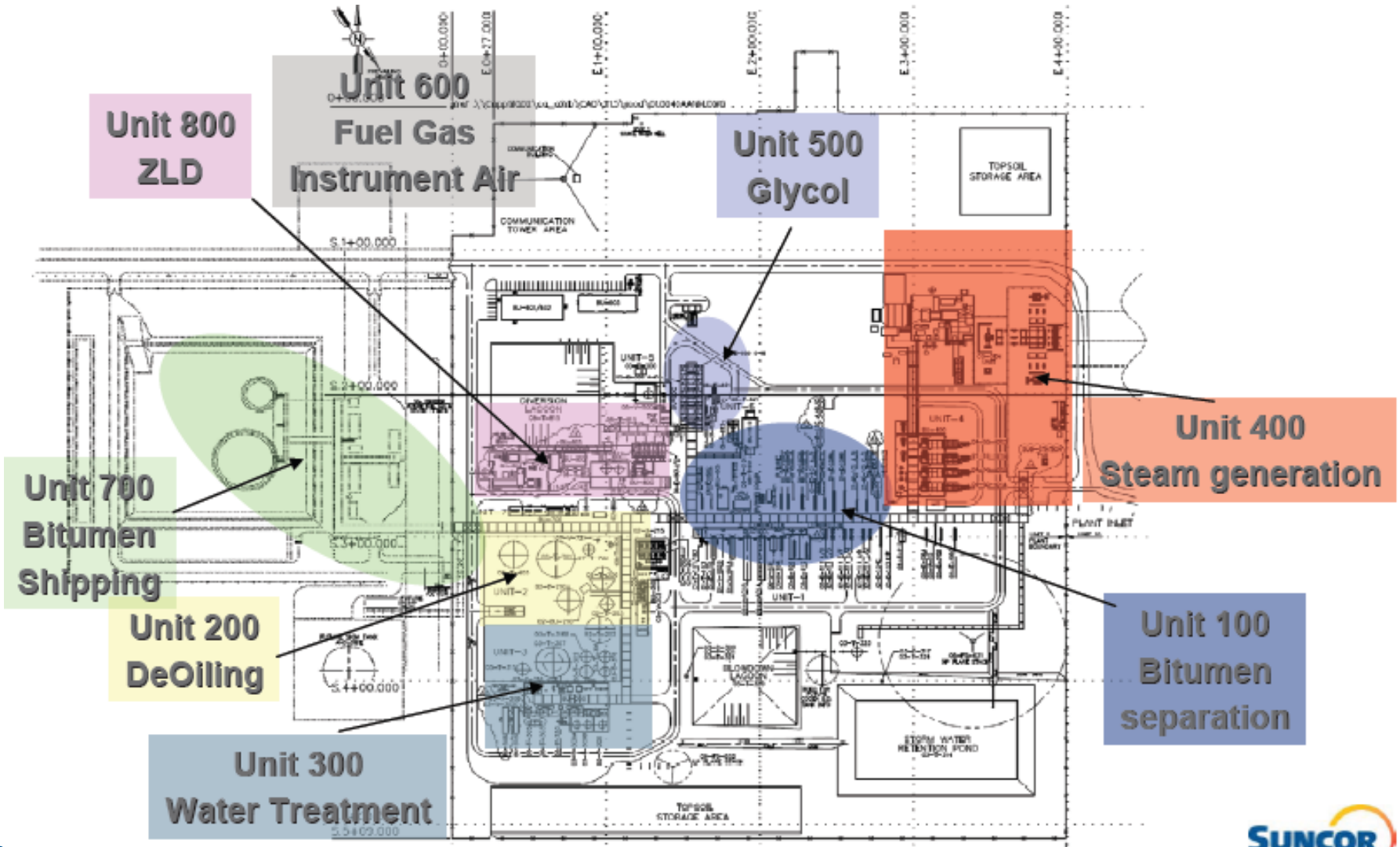
SUNCOR ENERGY

2010 ERCB Performance Presentation

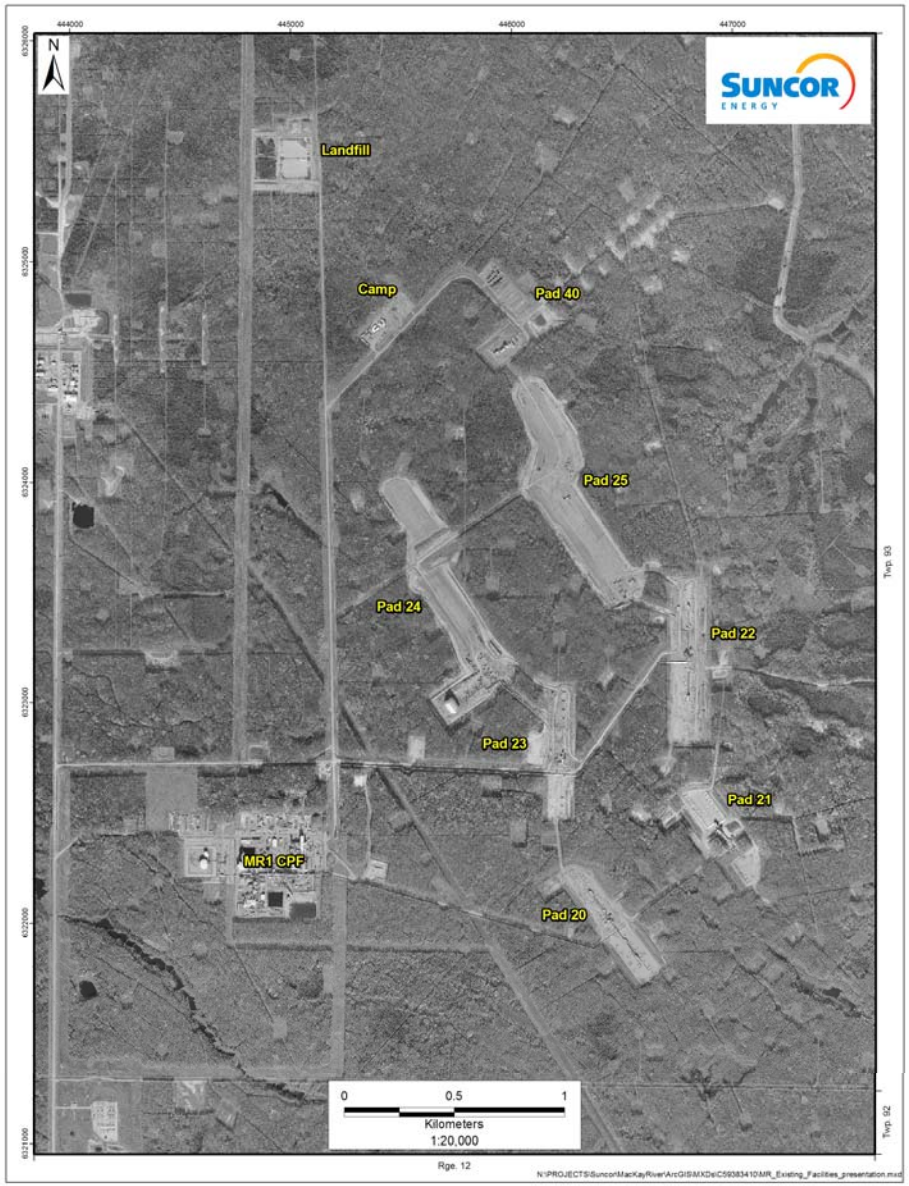
Section 3.1.2 – Surface Operations, Compliance and Issues Not Related to Resource Evaluation and Recovery

Table of Contents

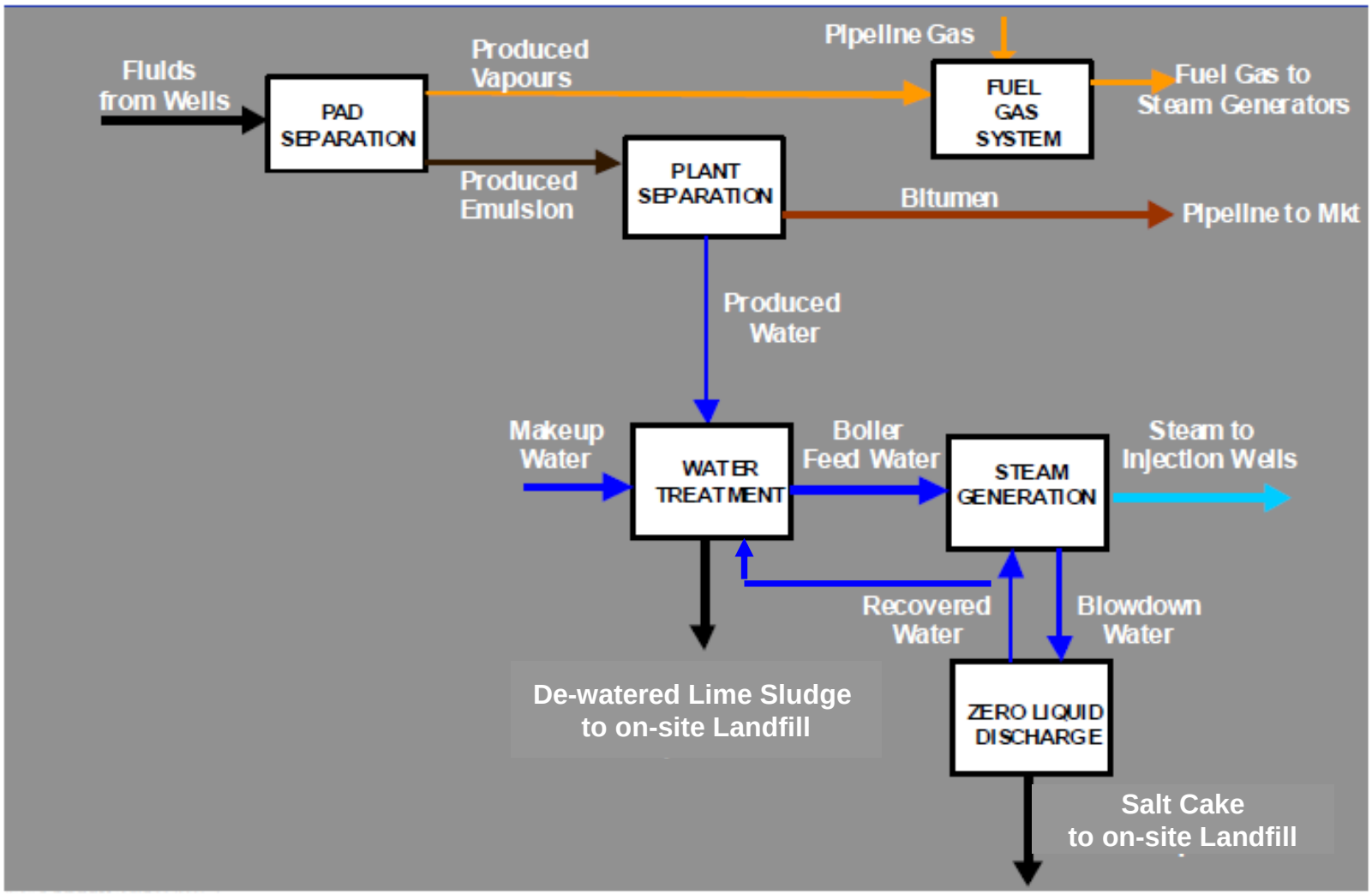
Facilities: Plant Plot Plan



Facilities: MacKay River Project Site



Facilities: Simplified Plant Schematic

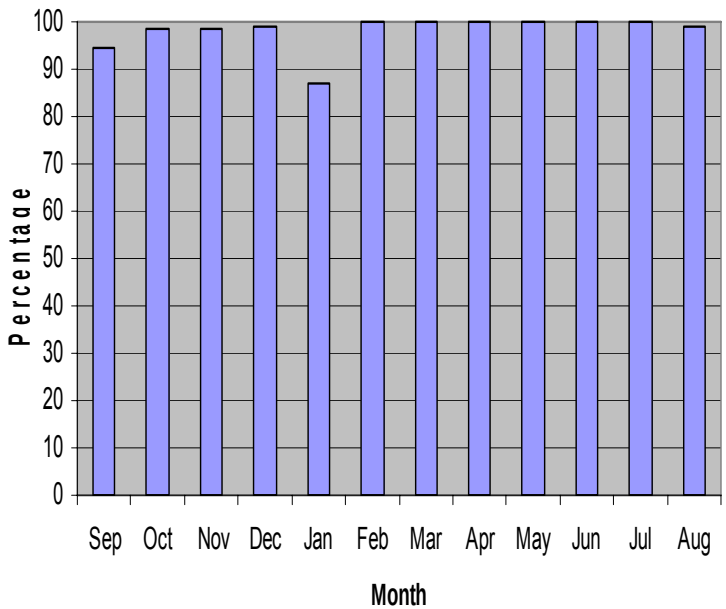


Facilities: Plant Performance

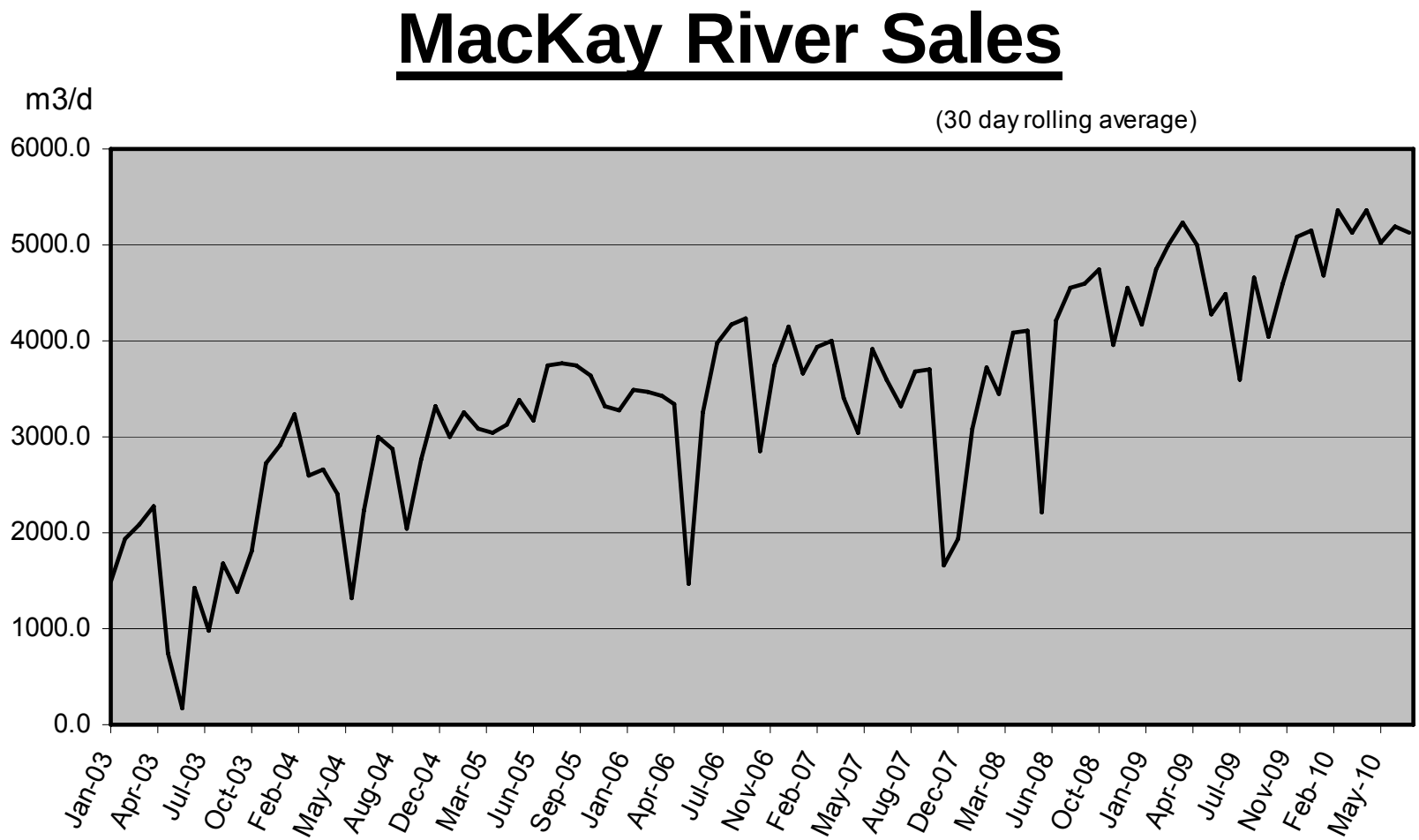
- The reliability of the facility has improved:
  - Reroute Pad 20/21 test pumps
  - Brine feed directly to the dryer
  - Increased exchanger cleaning
  - New instrument air compressor
  - Increased desanding of HT separators
- Major challenges :
  - Power outages – addressed through LP vent elimination (LP vent contributed to formation of ice on insulators in substation causing arcing and power outage) and increased maintenance (transformer issues)
  - High temperature separator inlet produced fluid piping fouled due to minerals, resulting in increased backpressure at the pads and reduced production. Fouling worsens at higher temperature and lower velocity. Plan to address problem through improved temperature control, flow balancing and the addition of a back up line / cleaning program.

Average 98.1 %

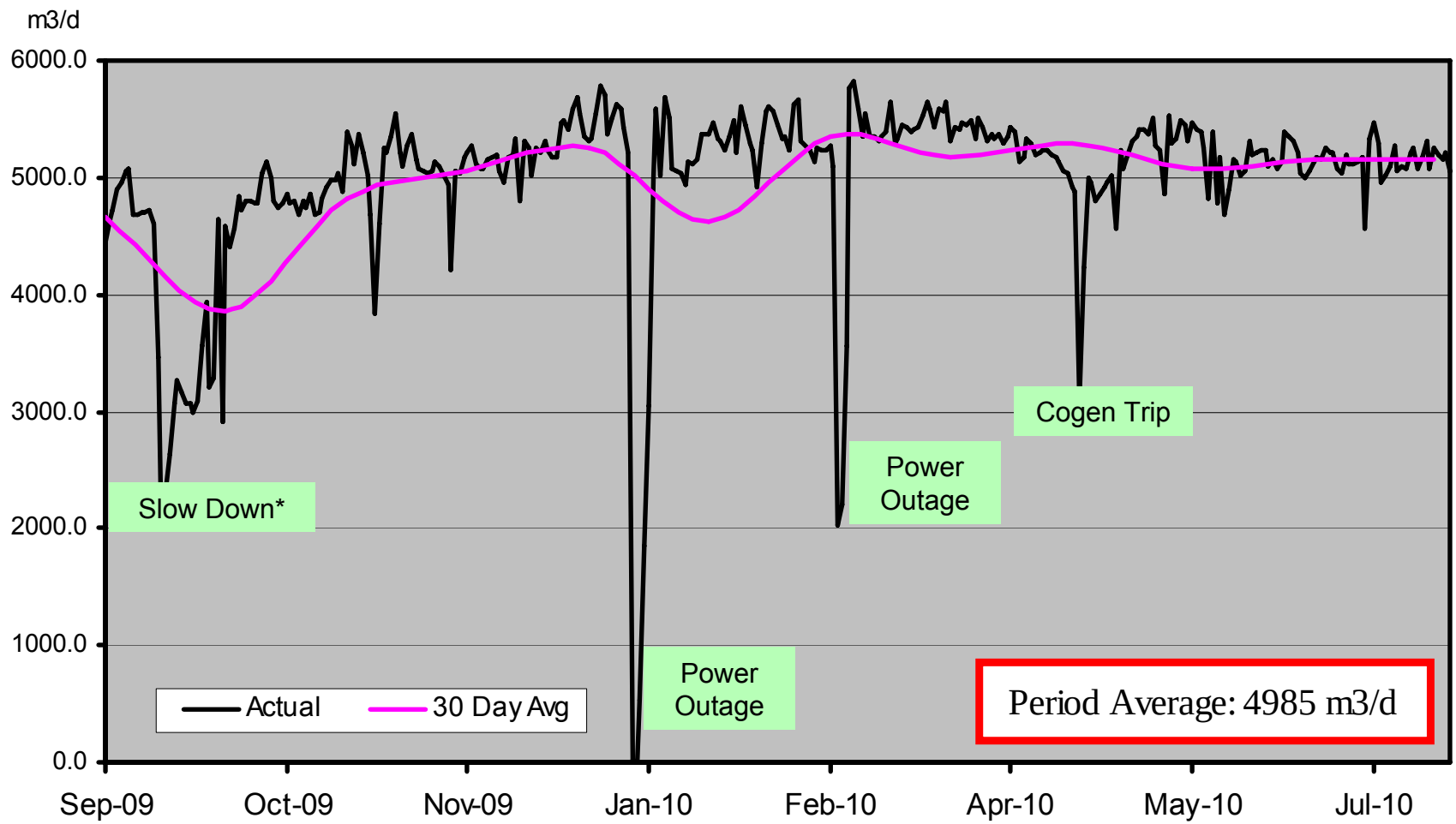
(September 2009 to August 2010)



Plant Performance - Historical Production (Jan 2003 to Aug 2010)



Plant Performance – Production (Sept 2009 to Aug 2010)



* Slowdown refers to a period of planned maintenance which causes a reduction in steam availability.

SUNCOR ENERGY

Water Treatment: Technology

- Warm Lime Softening and Weak Acid Cation softening for produced water

- ZLD System on blow down – slip stream:
  - Evaporators: one steam and one mechanical driven
  - Crystallizer: Steam driven
  - Dryer: gas fired
  - Filter press (2): back up for dryer

SUNCOR ENERGY

MacKay River Boiler Feed Water Quality

Parameter	**Avg value (Sept 2009 – Aug 2010)**	Max value during period	BFW Specifications
Temperature, ºC	**149**	174	140 – 170 *
Hardness (Dissolved), mg/L	**0.2**	1.1	< 1.0
Total Dissolved Solids, mg/L	**6259**	7904	< 8000
Silica, as SiO_2, mg/L	**18.6**	54.0	< 50.0

* Agreement in place with TransCanada Energy which allows BFW temperature up to 185ºC for a trial period once the new BFW / blowdown exchanger is installed (LP steam vent elimination project)

SUNCOR ENERGY

Water Treatment: Successes and Challenges

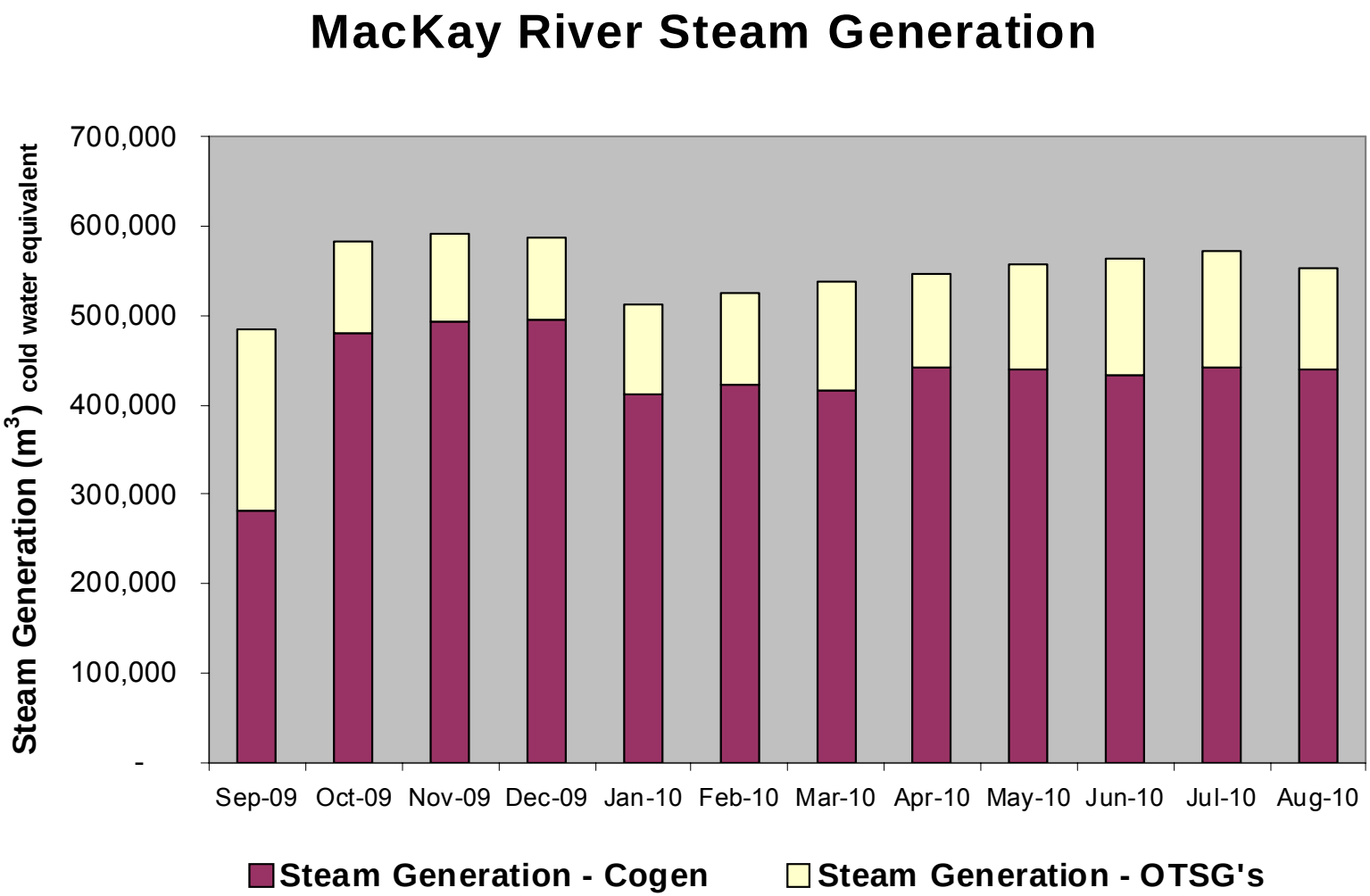
The Warm Lime Softener performance has been excellent:

- Reliability > 97.8 %
- Record consecutive days on spec: 172
  - On spec parameters: temperature, hardness, total dissolved solids, pH, silica, oil, free oxygen, total dissolved iron

Challenges:

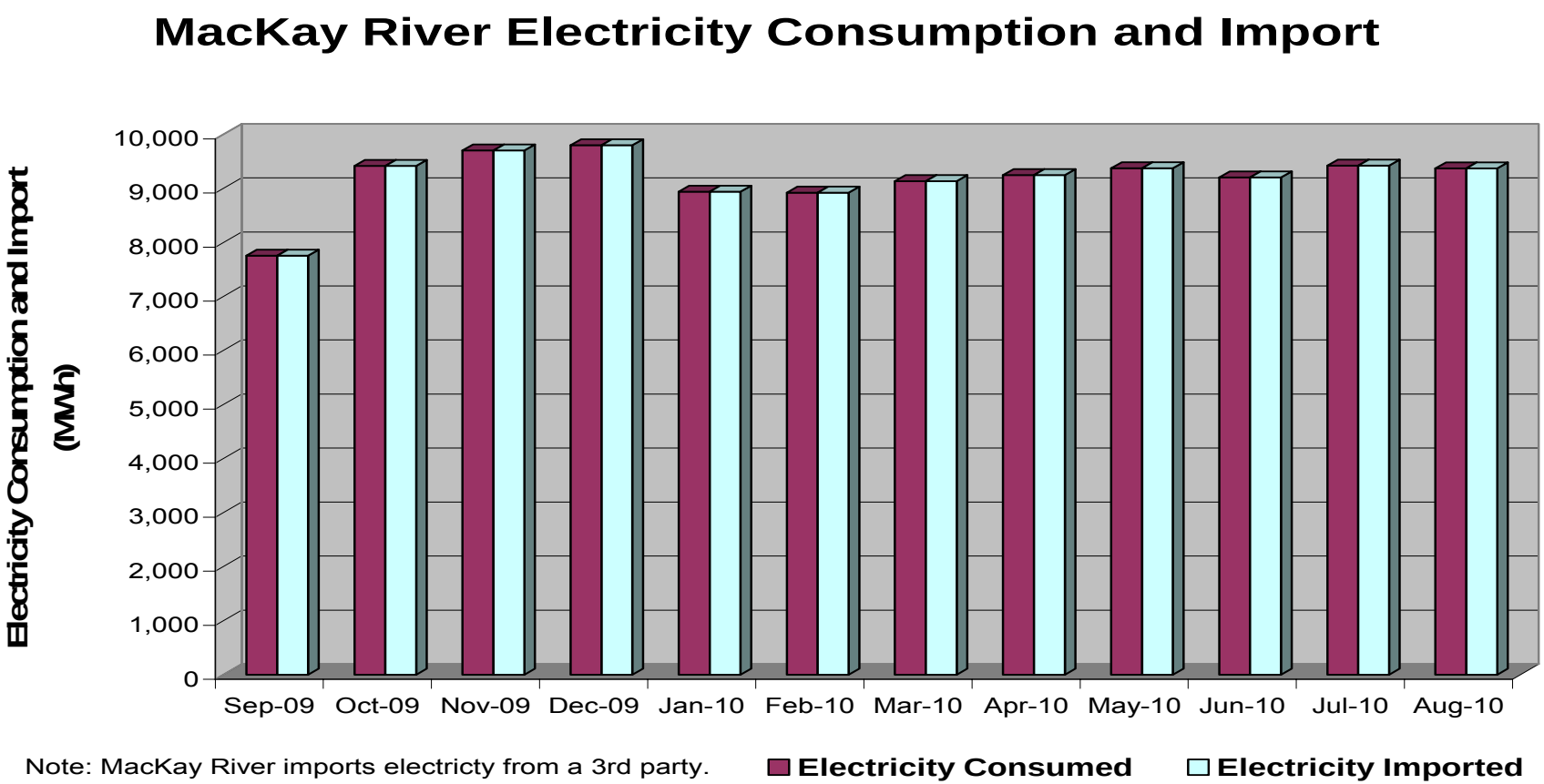
- Chemical feeding issues
  - Challenges with dry powder handling – feed rate control and plugging issues
- Dryer Reliability
  - Dry product quality and rotating equipment reliability
  - Improved recently
- WACs regen cost and frequency
  - Standard water treating challenges – working on optimizing
    - WACs regenerations are typically initiated on hardness breakthrough.
    - Occasional high hardness values at the WLS outlet have increased the load on the WACs, thereby increasing the regen frequency.
    - Fouling of the resin with organics can occasionally necessitate a detergent wash step during regeneration
- Water quality advanced forecasting
  - Involving upstream operation and chemical (e.g. increased hardness in produced water)

Steam Generation

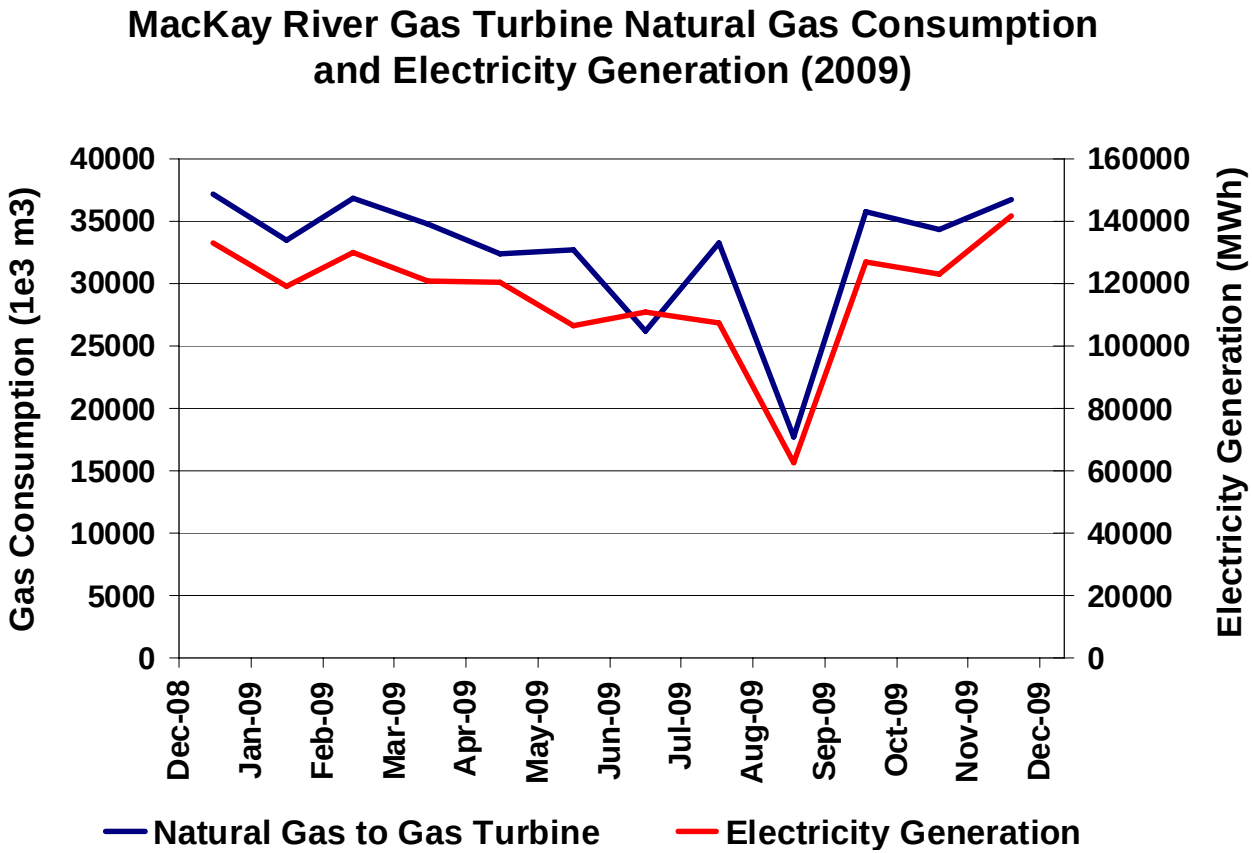


MacKay River Steam Quality from Cogen is maintained at 77%

Power Generation

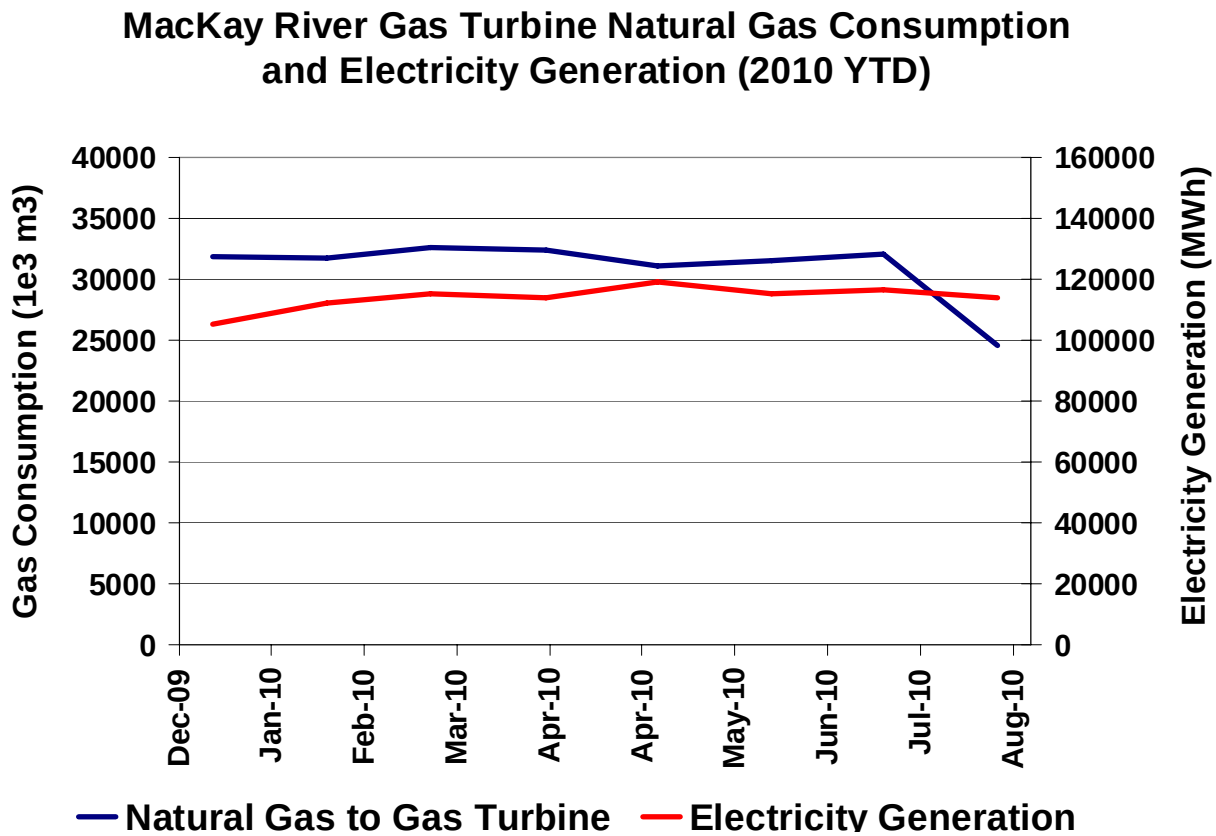


Gas Turbine Natural Gas Consumption and Electricity Generation (2009)



- Cogen electricity generation owned by 3rd party – TransCanada Energy
- Suncor imports steam and electricity from the 3rd party facility
- Natural gas consumed in the gas turbine is used for both electricity and steam generation

Gas Turbine Natural Gas Consumption and Electricity Generation (2010 YTD)



- Cogen electricity generation owned by 3rd party – TransCanada Energy
- Suncor imports steam and electricity from the 3rd party facility
- Natural gas consumed in the gas turbine is used for both electricity and steam generation

Energy Intensity

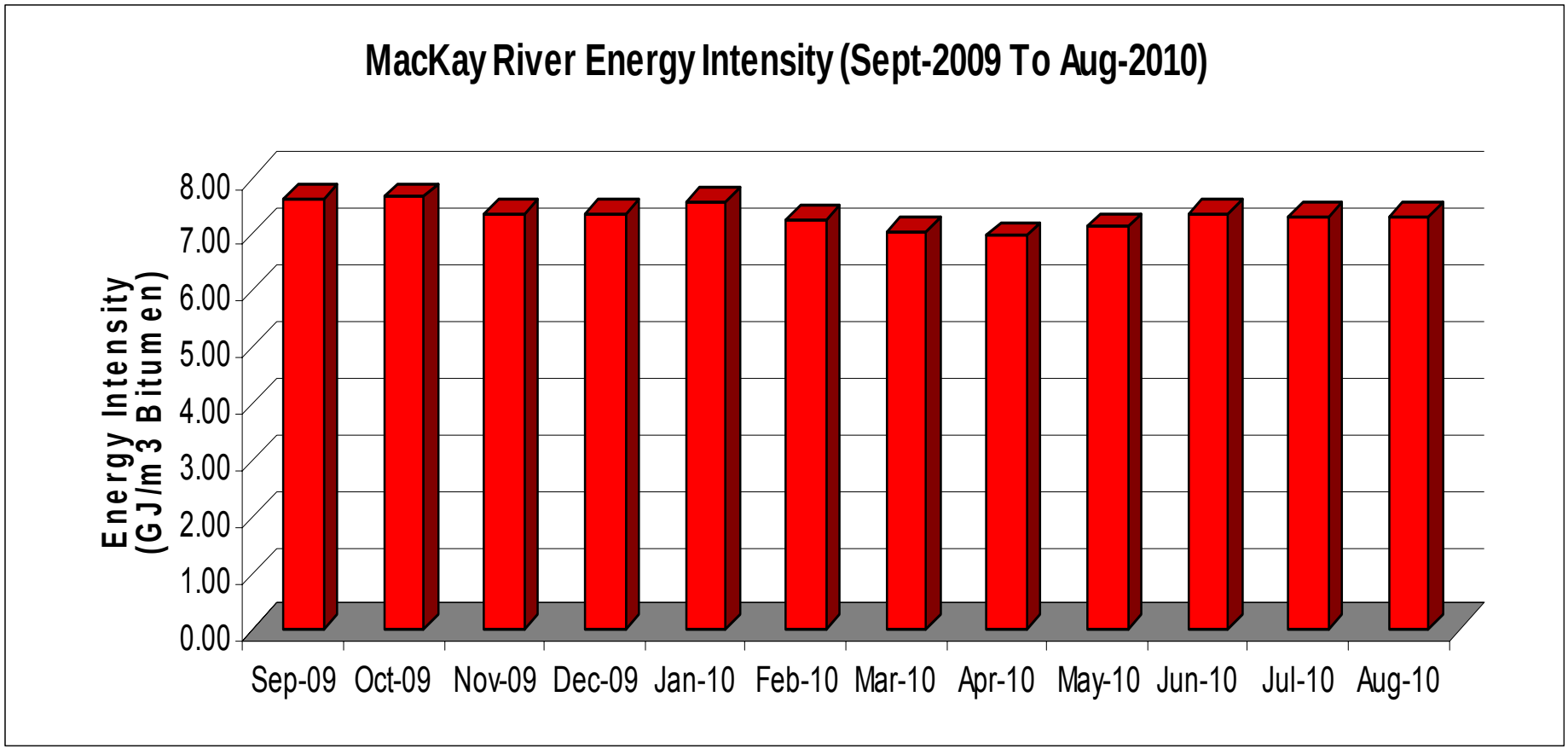
- Energy Intensity Formula
  - Energy Intensity (GJ/m^3) = Total energy consumed by site / Sales bitumen volume
  - Total energy consumed by site (GJ) = Energy used to make steam in Cogen + Natural Gas imported to site + Solution gas to Cogen + Electricity consumed by site – Mixed gas to Cogen duct firing
    - Note that the term “site” does not include Cogen
  - Energy used to make steam in Cogen (GJ) = Steam produced by Cogen x Hourly average difference in enthalpy between steam and BFW x 0.89 / 0.82
    - This equation is from the contract between Suncor and TransCanada Energy
    - Emissions calculations for Cogen are also based on this formula

SUNCOR ENERGY

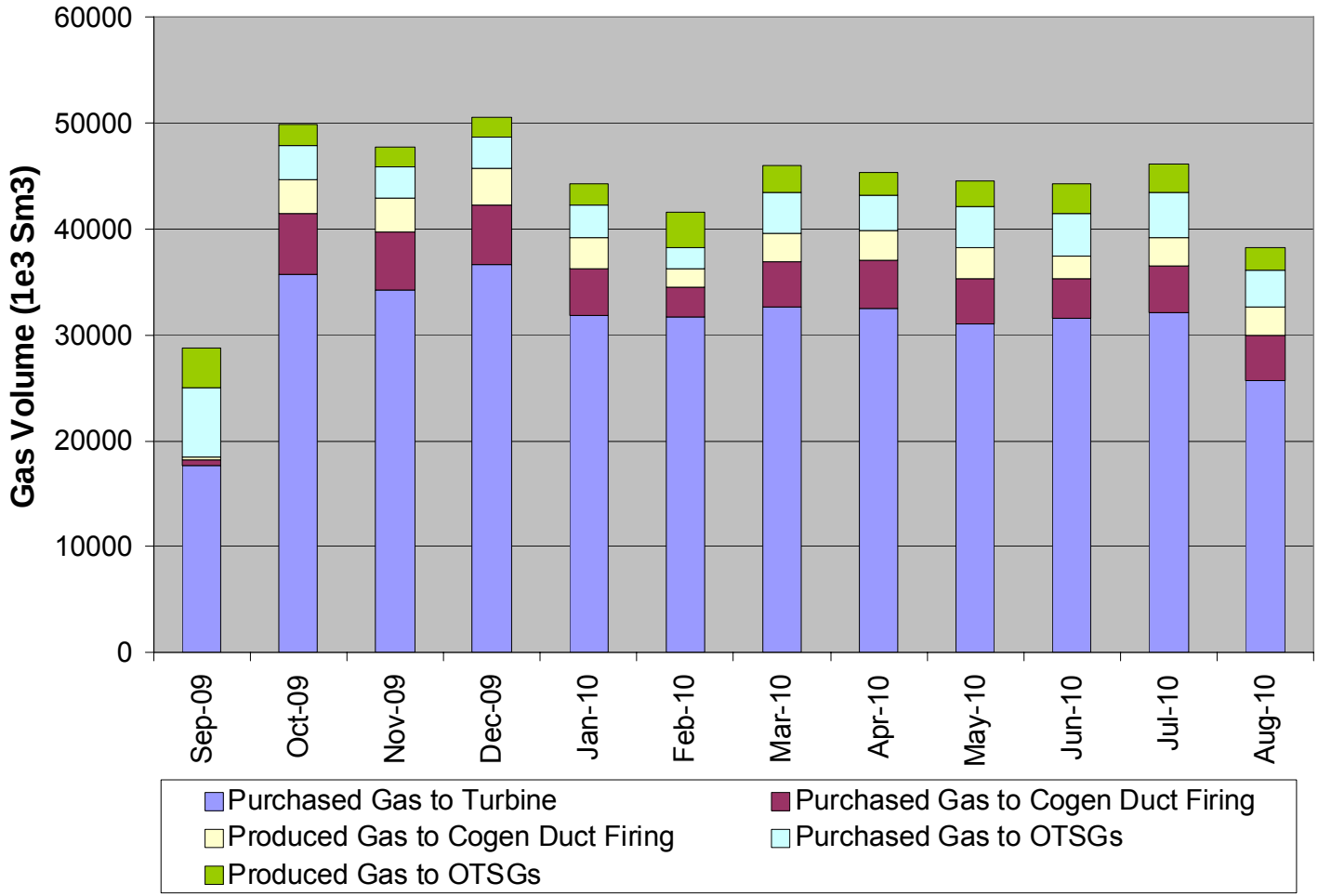
Cogen Agreement with TransCanada Energy

- Energy exchange: TransCanada Energy (TCE) provides steam and electricity to Suncor in exchange for BFW and a “fee”
  - Fee calculated as GJ of fuel gas equivalent in compensation for steam and electricity (energy equivalent value based on contractual formula: see energy intensity slide)
  - Suncor provides on-spec BFW and fuel gas, maintains MacKay River facility within specified outage hours, and takes a minimum steam requirement
  - Mixed gas supplied by Suncor to TCE credited against total gas “fee” requirement
  - TCE required to provide all other excess gas for the operation of Cogen
  - TCE sells excess electric energy generated by Cogen to the market

Mackay River Plant - Energy Intensity



MacKay River Gas Consumption



- The vast majority of the “Produced Gas” shown in the above graph is purchased gas used as Lift Gas
- Gas to Turbine is used by TransCanada Energy to generate electricity and steam

Mackay River Plant - MARP

- MARP approved in April 2010
- MARP will be updated on or before Feb 28 of each year
- MARP details all the required data in Directive 42
- Metering compliance issues covered in the MARP
  - Meter calibrations are performed in compliance with Chapter 2 of Directive 17
  - Accuracy of measurement systems meets the requirements in Directive 17
  - Meter locations are indicated in the metering diagrams included in the MARP

MacKay River Plant - Measurement

Well production

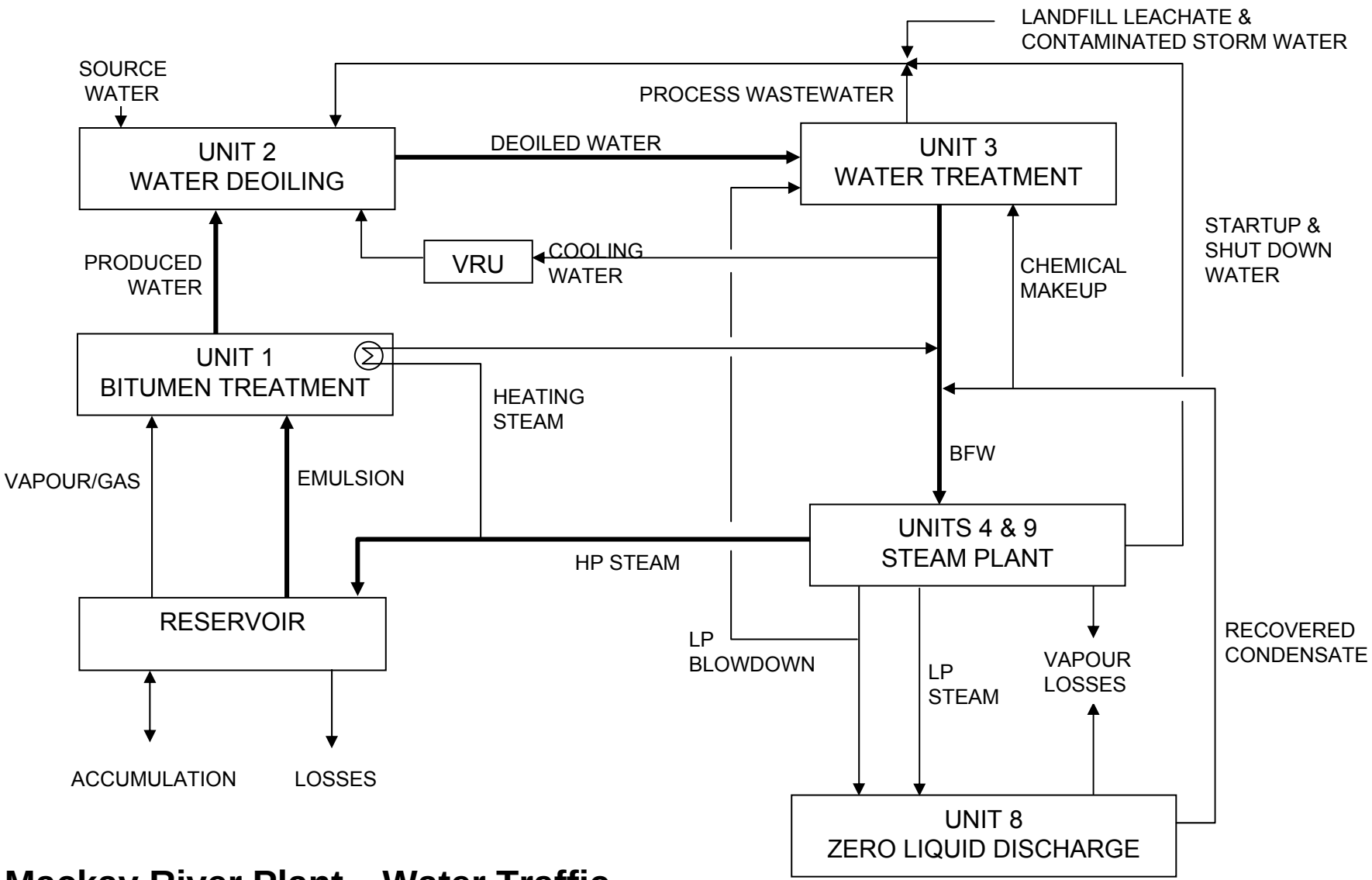
- Each SAGD production well is directed to a test vessel at the pad numerous times each month. A typical testing frequency is once every 2 – 3 days. Test duration per well is typically 5 hours.
- Experience has shown valid tests can generally be obtained in less than 3 hours.
- Flow rates are measured by a Coriolis meter while water/bitumen cuts are determined by an Agar probe
- Reported volumes are prorated based on measured total volumes at the plant
- Details of measurement and reporting procedures may be found in the MARP (Measurement, Accounting and Reporting Plan)

SUNCOR ENERGY

Mackay River Plant – Measurement cont'd

Water Balance

- Steam:
  Present method: Steam Injected = Σ All Meters to injection wells
  MARP approved method: HP steam ultrasonic meter pending resolution on foaming issue
  - Antifoam trial did not help
  - Once new exchanger E-442 is in service and blowdown meter installed, proposed steam measurement method will be = BFW to OTSGs minus blowdown
- Raw Water = Σ Water Source wells (3 water source wells)
- Produced Water:
  MARP approved method: Flow meter from the de-oiled water tank
- Vapour losses are estimated:
  LP Steam vent losses will be minimized by the installation of new exchanger
  ZLD will have vapour loss to atmosphere
- Details of measurement and reporting procedures may be found in the MARP



Mackay River Plant – Water Traffic

Fresh Water

Source Water Wells

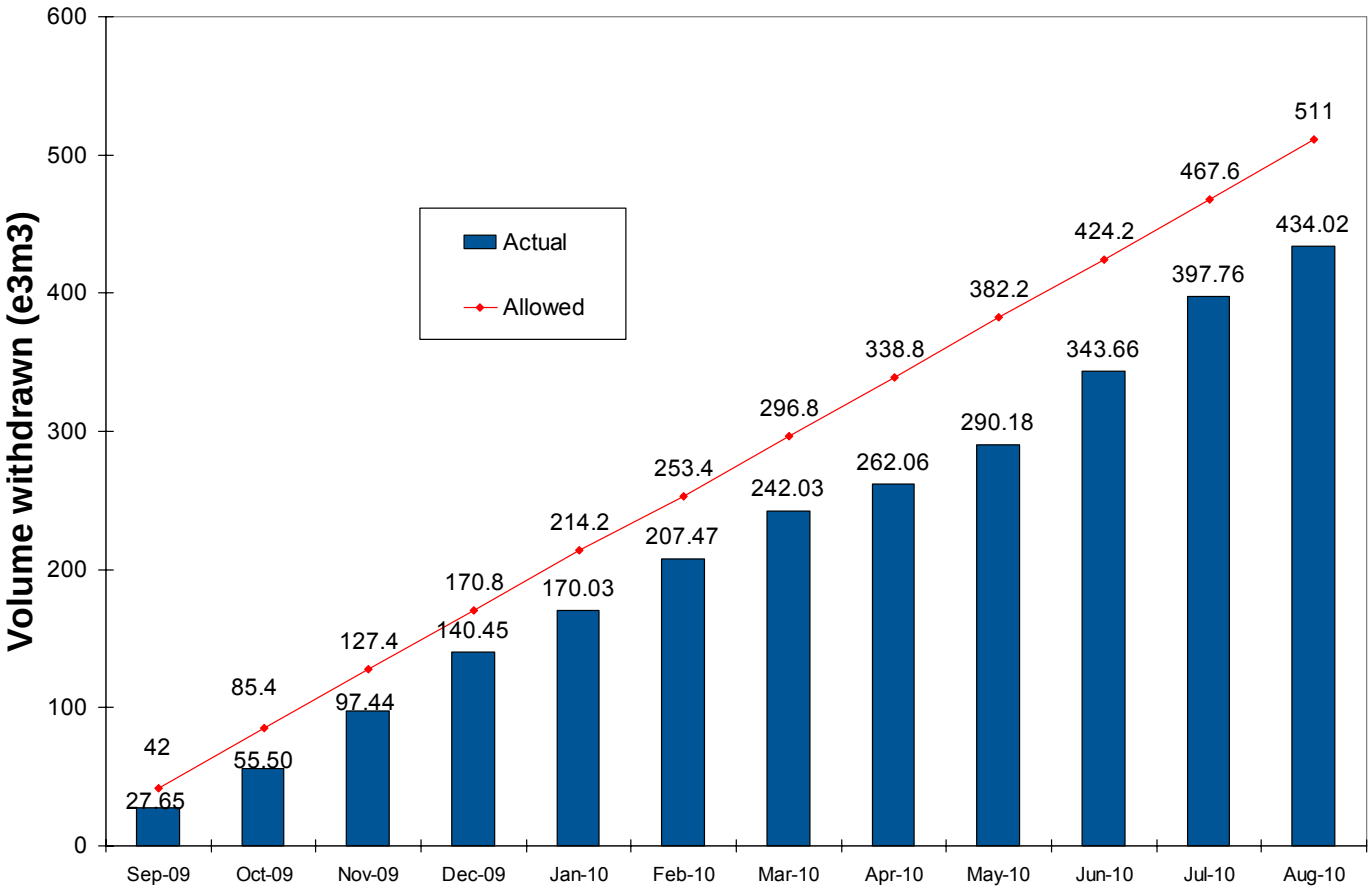
- AENV Water License No. 00188229-00-02
  - Birch Channel Aquifer 13-05-093-12W4 (WSW-1)(450 m3/day)
  - Birch Channel Aquifer 04-08-093-12W4 (WSW-2)(1368 m3/day)
  - Birch Channel Aquifer 04-08-093-12W4 (WSW-3)(1411 m3/day)

Domestic Water Well

- AENV Water License No. 00249470-00-01
  - Birch Channel Aquifer 13-05-093-12W4

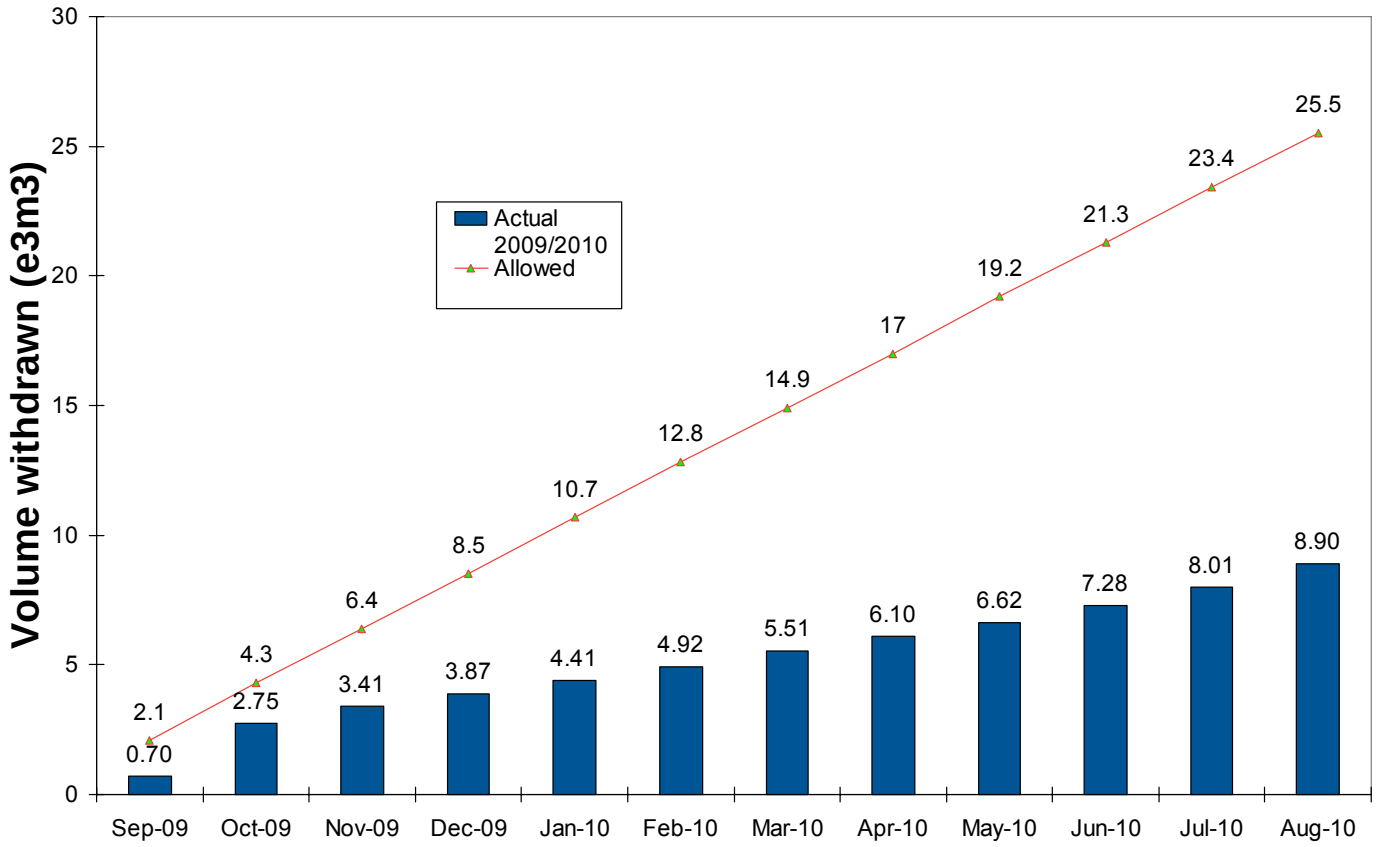
Monthly reporting done through WURS

Raw Water – Source Wells



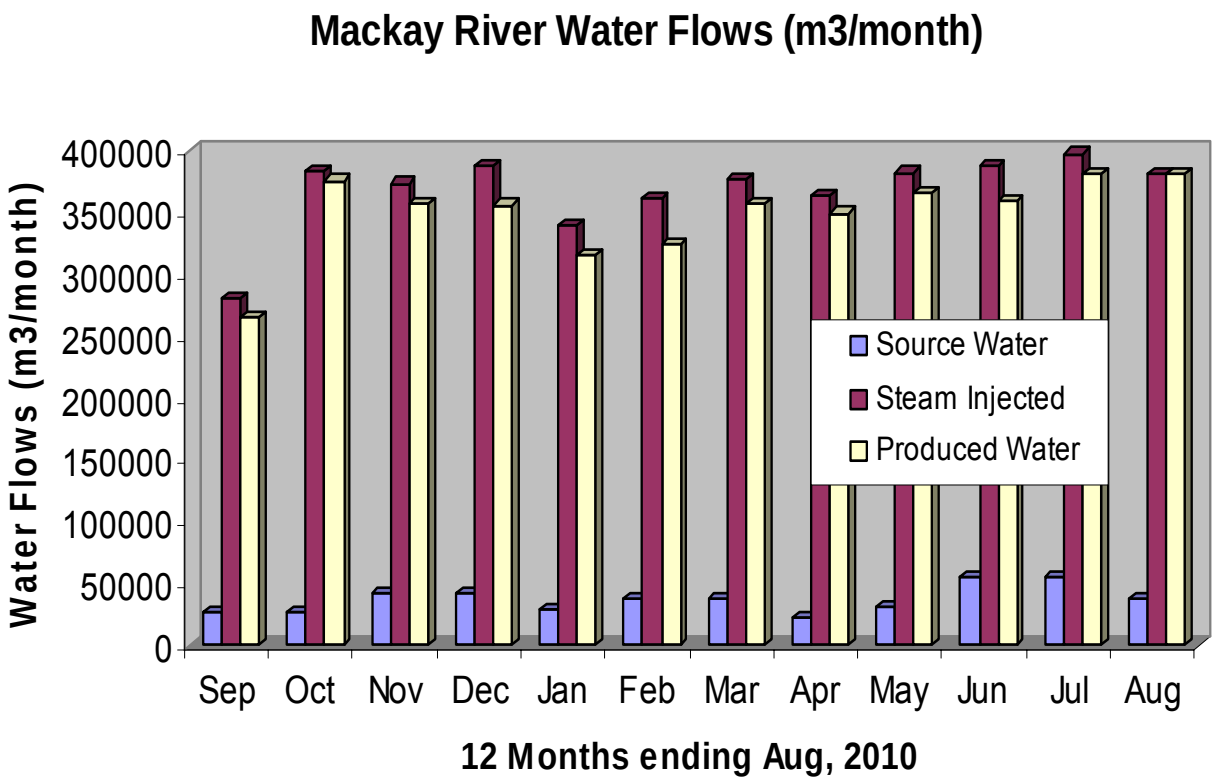
- Regulatory allowable limit from Alberta License No. 188229 is 1.4e^{3}m^3/day (511e^{3}m^3 per year)

Raw Water – Domestic Well



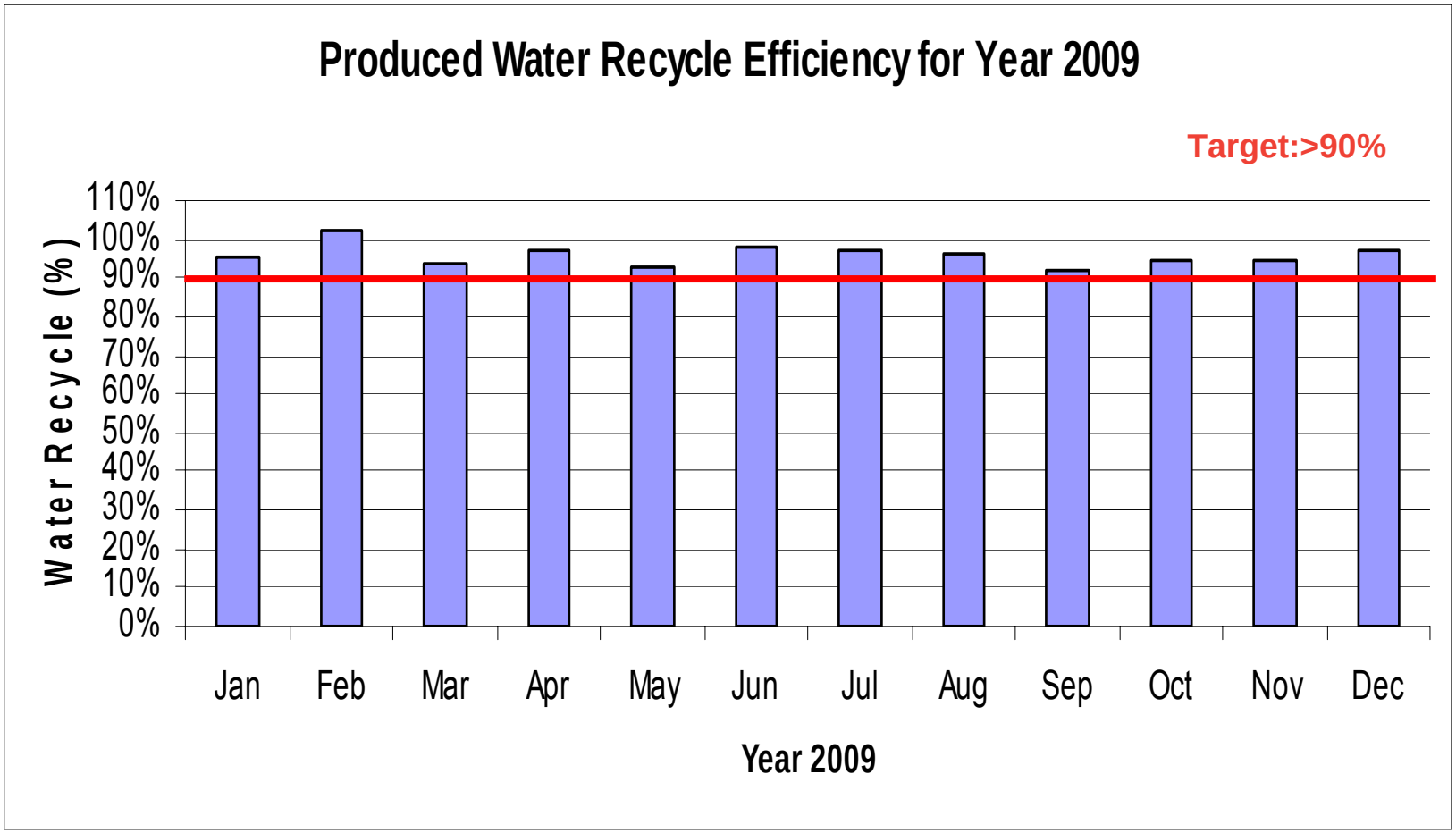
- Regulatory allowable limit from Alberta License No. 249470 is 0.16 e^3m^3/day (25.55 e^3m^3 per year)

Mackay River Plant - Water Balance
(September 2009 – August 2010)

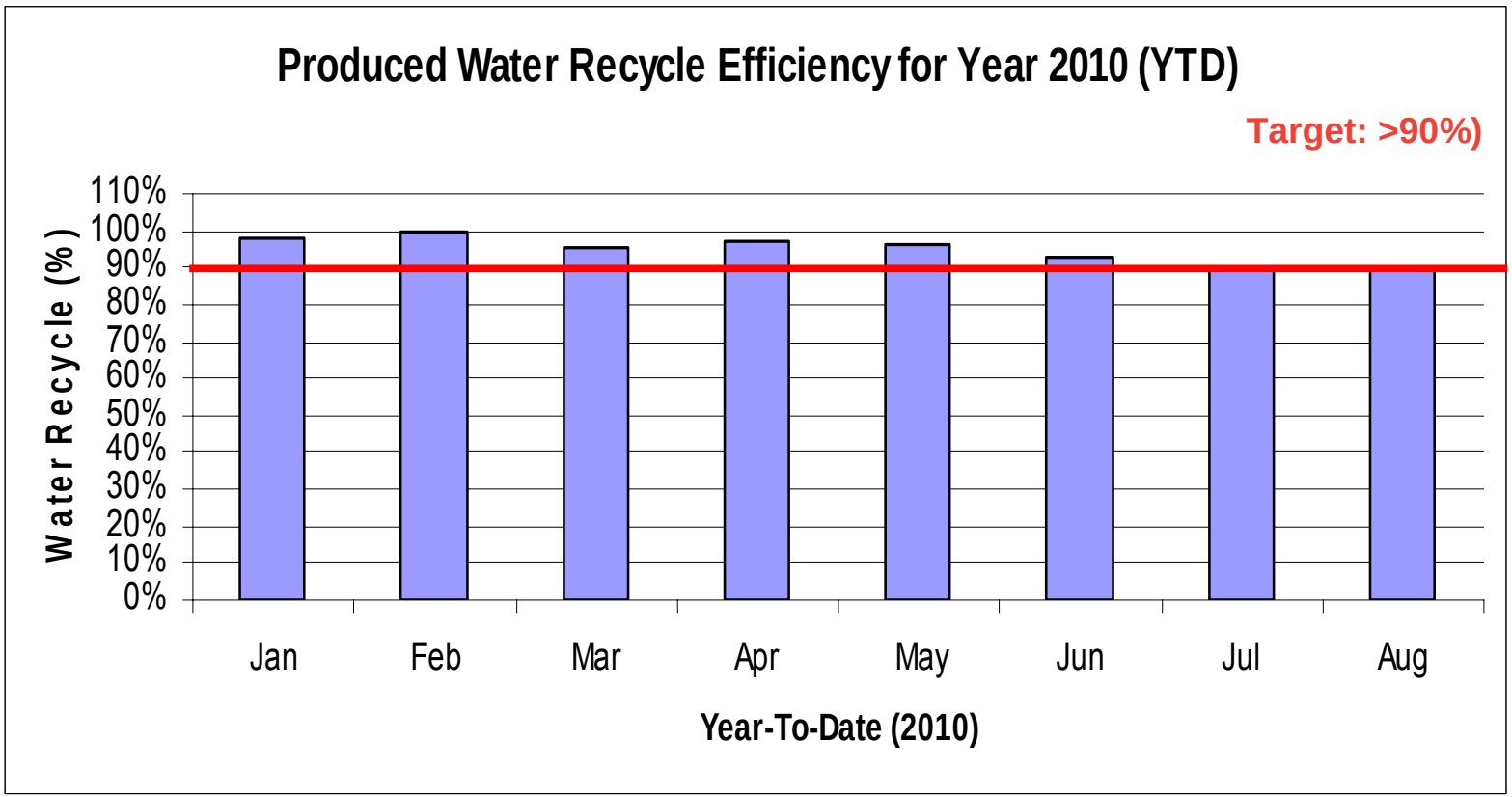


Make up Water TDS = 1400 mg/l

Mackay River Plant – Water Recycle Efficiency (Year 2009)



Mackay River Plant – Water Recycle Efficiency (Year-To-Date 2010)

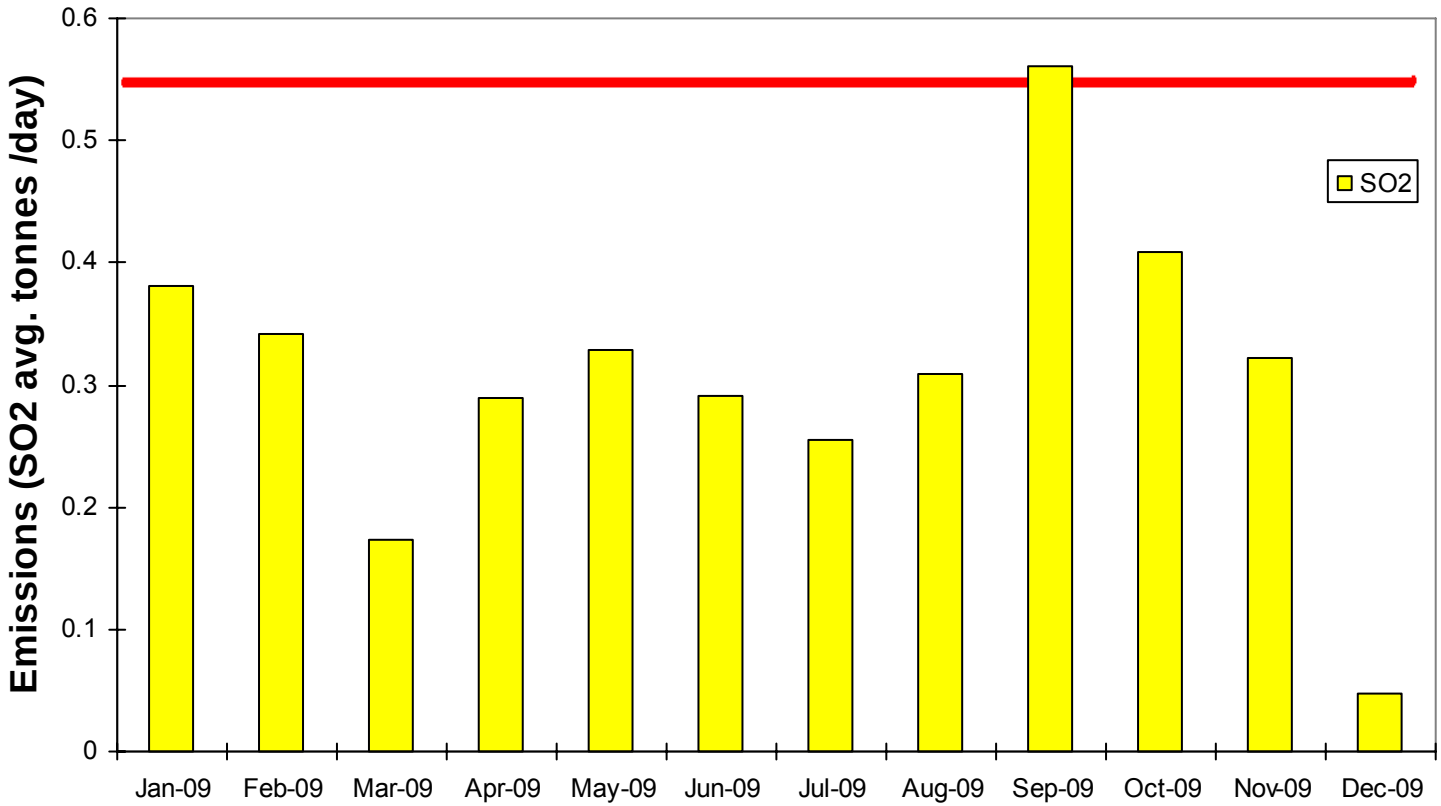


Mackay River – Low Pressure Blowdown Recycle
(September 2009 to August 2010)

- Blowdown Recycle = 100%
  - Low Pressure Blowdown Treated in the Water Plant: 53,298 m3/month (Average)
  - Low Pressure Blowdown Treated in the Zero Liquid Discharge Plant: 42,298 m3/month (Average)
- Trucked volumes from Diversion Lagoon
  - 2008(Petro-Canada)- 39, 806 m3
  - Jan 2009- July 2009(Petro-Canada)- 21,617.5 m3
  - Aug 2009- Dec 2009(Suncor Energy)- 15,659.0 m3
  - Jan 2010- Oct 2010 (Suncor Energy)- 33,833.0 m3

MacKay River Sulphur Dioxide Emissions 2009

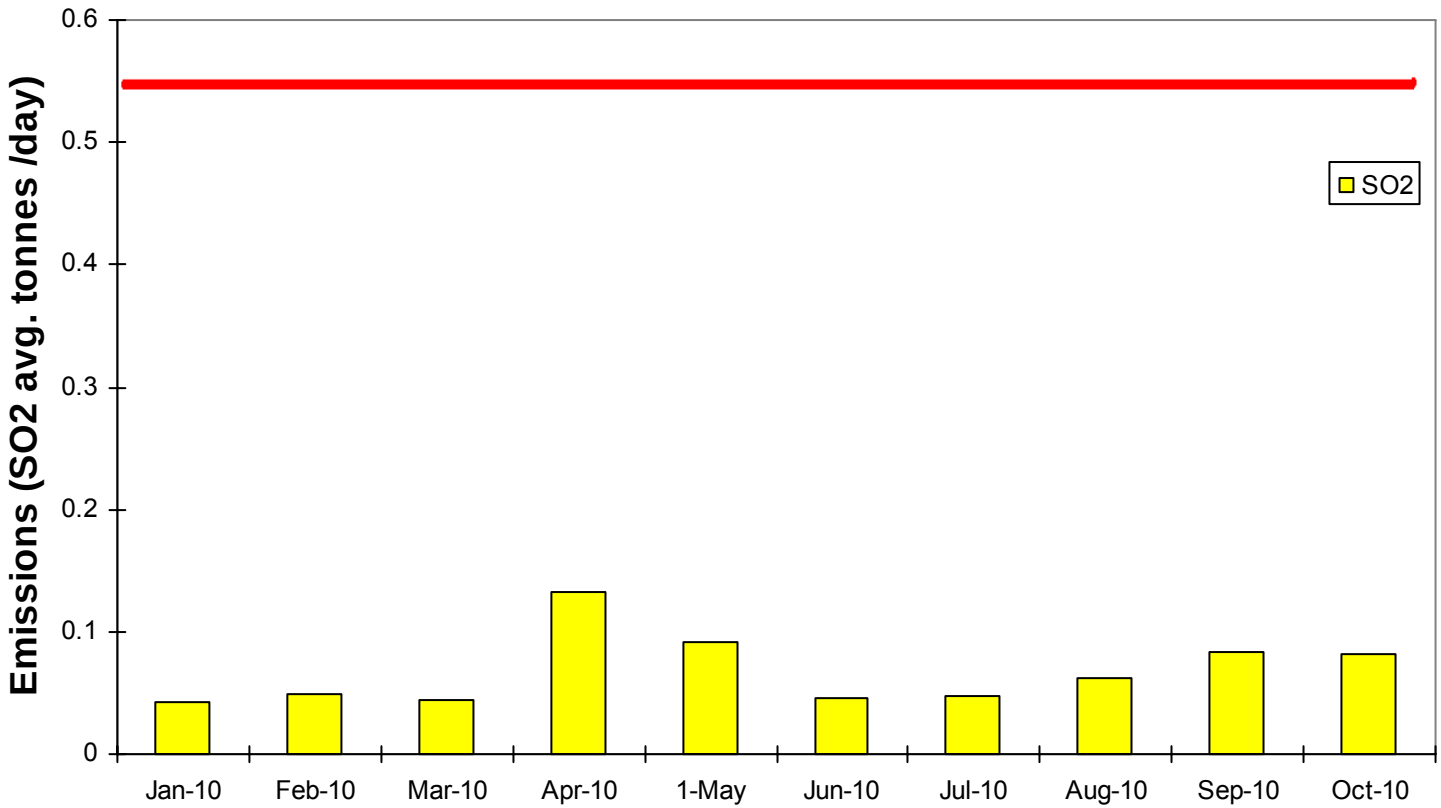
ERCB facility licence limit = 0.55 t/d



•S02 emissions are calculated from monthly produced gas samples

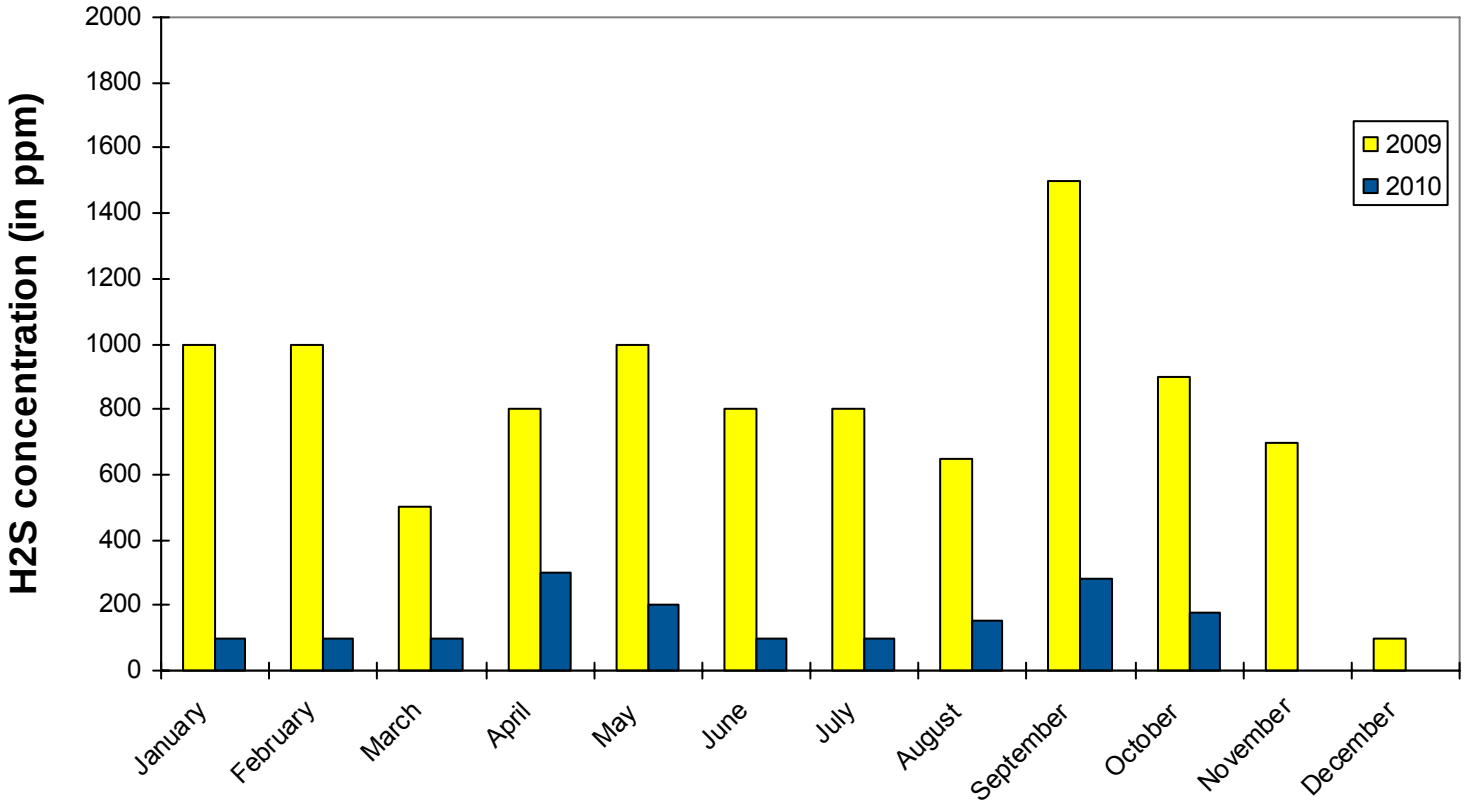
MacKay River Sulphur Dioxide Emissions 2010

ERCB facility licence limit = 0.55 t/d



- S02 emissions are calculated from monthly produced gas samples
- Note: The sample port location for produced gas samples was changed in January 2010 . A new sampling port was chosen after excessive condensate buildup caused a missed sample

MacKay River H2S Concentration



- H2S concentrations are measured in monthly produced gas samples
- Difference in concentration of H2S between 2009 and 2010 is due to change in the sample port location for produced gas samples which was changed in January 2010. A new sampling port location was required to improve sample quality and to ensure representative samples could be collected.

MacKay River GHG Emissions

- MacKay River submitted its annual SGER report to AENV and NPRI GHG report to Environment Canada
- Total direct emissions for 2009
  - 145,595 tons of CO_2equiv
- Net emissions intensity
  - 0.0855 tonsCO_2equiv/m^3 bitumen
- TransCanada Cogeneration facility emissions are independently calculated and reported

SUNCOR ENERGY

Ambient Air Quality Monitoring

- 4 passive air monitoring stations at MacKay River
- Monthly ambient air quality monitoring performed monthly by a site representative and reports/sample analysis submitted to AENV by WBEA (Wood Buffalo Environmental Association) for H2S, N02,03 and S02
- Ambient air quality data available for viewing on WBEA website
- No air quality exceedences at MacKay River

SUNCOR ENERGY

MacKay River Landfill / Waste Management

ERCB Approval WM-072C Class II Oilfield Landfill

- Volumes of solids to landfill (Sept 09 to Aug 10)
  - Lime Sludge: 12,806 m^3
  - Salt: 14,298 m^3
- Volumes of landfill fluids to facility (Sept 09 to Aug 10)
  - Combined: 15,076 m^3
- Waste Survey completed in January 25, 2010
  - Salt Cell: 36,746 m3 (approved for 38,940m3)
  - Lime Sludge Cell: 26,228 m3 (approved for 27,600m3)
  - Phase 2 Cell: 30,899 m3 (approved for 86000m3)
- Estimated waste in Phase 2 Cell 46,705m3
- Phase 3 development application planned for late 2010.
- Waste Services contract in place
  - addresses hazardous, recycling, domestic and landfill
- Waste Tracker software used to track and submit manifests to ERCB

SUNCOR ENERGY

Regulatory Compliance (Sept 2009 to Aug 2010)

Regulatory Inspections.

- October 27th, 2009 ERCB inspection

  Follow-up items
  - Well testing at Pad 20 and 21
  - Production Accounting
  - MARP
  - LP Steam Enforcement Action

- March 17th, 2010 ERCB Oilfield Waste Management Facility (OWMF) Inspection
  - Satisfactory inspection (no action required)

- ASRD inspection August 12, 2010
  - ASRD inspection was conducted to verify vegetation around the LP and HP flare meets the terms of a 2006 agreement.
  - Satisfactory inspection (no action required)

SUNCOR ENERGY

Regulatory Enforcement Update

(Sept 2009 to Aug 2010)

- Total Steam injected and produced water (Dec 2008) High risk enforcement for LP steam venting issued June 26, 2009
  - October 5, 2009 - Letter from the ERCB approving action plan
  - Five quarterly reports have been submitted to the ERCB to date and the installation of the new exchanger is on track for Q2 2011.

Regulatory Enforcement Update
(Sept 2009 to Aug 2010)

- First Notice of Low Risk Non-Compliance
  August 25, 2010
  - Annual Oilfield Waste Disposition Report

- Landfill Self Disclosure
  - Missed Under-drain Sampling in Cell 2
  - Liner tears: 2 for Phase II, plus Phase I salt cell
  - Surface water control issues

Release Management - Reportable Releases

ERCB Reportable Releases:

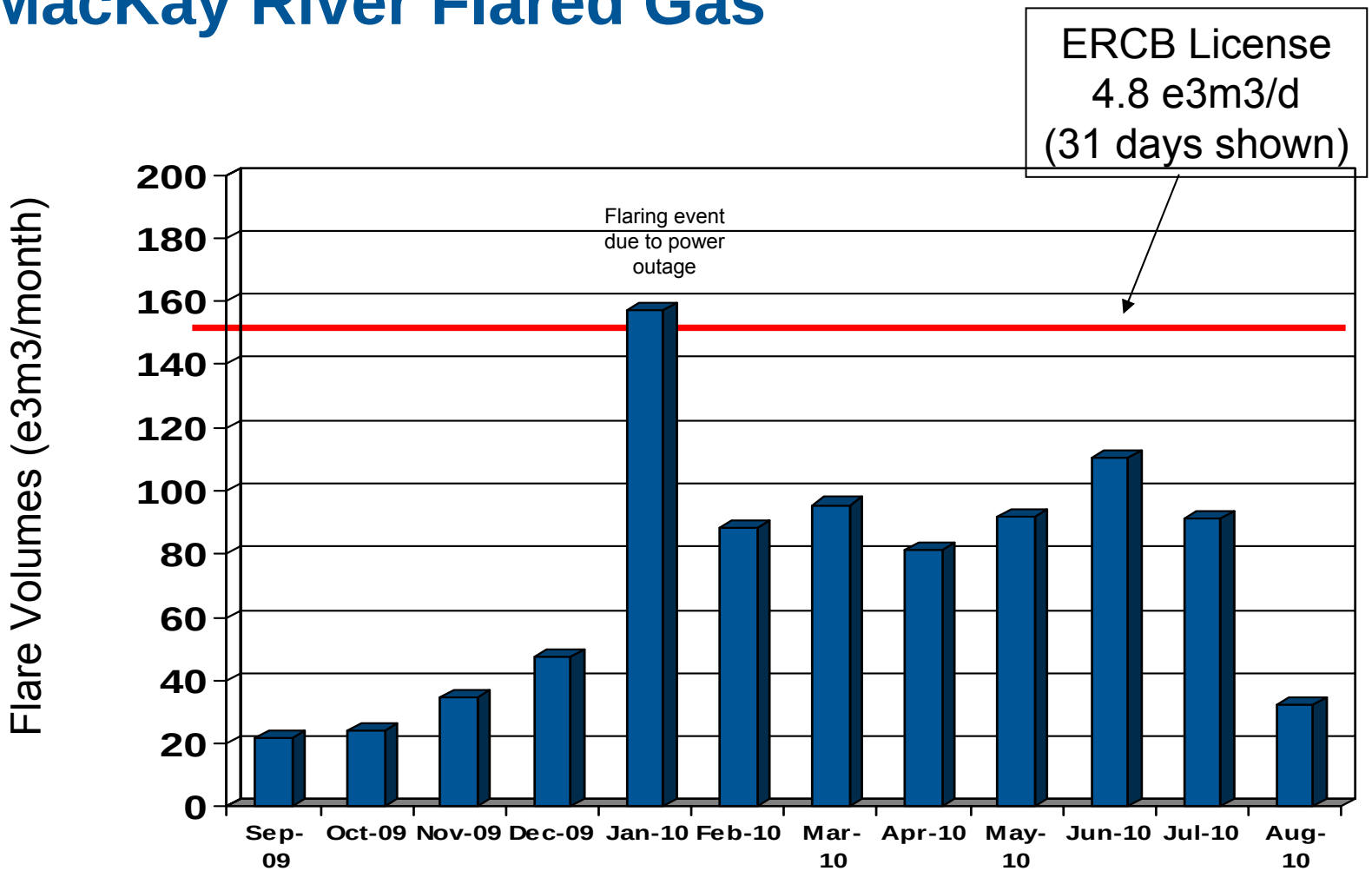
- 13 ERCB reportable releases from Sept 2009 to Aug 2010
  - 5 landfill sluice pond overflows, 6 liquid spills, 2 gas leaks

Environmental Awareness Training

- Core training requirement
  - Highlights Spill Awareness, Waste Management, Flaring etc.
  - Environmental Committee initiated in 2008 - converted to a site committee including maintenance, operations, technical services. Tour site monthly, etc..

SUNCOR ENERGY

MacKay River Flared Gas



Amendments / Applications

- OWMF Approval WM072 (landfill)
  - Amendment C granted November 2, 2009 for capping and closure of Phase 1 cells
- ERCB License F26405
  - Amendment of facility license granted September 21, 2009 for increase in total inlet rate for oil/bitumen to 6,360 m^3/day
- MacKay River Project EPEA Approval – extended one year to Aug 2011
  - EPEA Approval 48408-00-04 approved October 26, 2009
    - PDA expansion and Pad 28 approval
  - EPEA Approval 48408-00-05 approved December 18, 2009
    - Replacement of main glycol heater with two new heaters
  - Requested one additional year extension to EPEA Approval 48408 on September 24, 2010
- Changed holder name from Petro Canada to Suncor for the following licenses:
  - Water Act Licenses 188229-00-02, 249470-00-01 & 253385-00-01
  - Landfill Approval WM 072

SUNCOR ENERGY

Amendments / Applications

- Water Licence Renewal issued August 30, 2010
  - one year renewal of Licence No. 00188229-01-00 to be consistent with EPEA renewal
- ERCB Approval No. 8668 G Amendment issued June 21, 2010
  - amendment to routing of water streams & enhancements to ZLD, modifications to production treatment system, steam generation & utilities, & authorization to tie-in 6 MRE (Pad 25) wells to Pad 22
- Licence 52511 for emulsion pipeline between Pad 25 & Pad 22 issued August 19, 2010
- Voluntary self disclosure submitted March 17, 2010: no licence for Pad 23
- Licence F41630 for Pad 23 issued March 23, 2010
- Amendment to Licence F34024 issued August 23, 2010
  - amended Pad 22 maximum inlet rate & licensed H2S content of raw inlet gas, & category/type from battery to satellite.
- New Wildlife Research Permit (44237) and Collection License (44202) received from ASRD – April 1, 2010

Environmental Monitoring

Air Monitoring

- Four passive air monitoring stations located at MacKay River
- No air quality exceedences at MacKay River
- All required stack test within approval limits

Ground Water Monitoring

- Ongoing groundwater monitoring (semi-annually)
- Fall/2009 and Spring/2010 field program completed
- To date no groundwater impacts identified

Surface Water Quality

- Monitor surface water quality bi-annually, in spring and fall
- Active participant in the Regional Aquatics Monitoring Program (RAMP)

Soil Quality Monitoring

- Soil Management program submitted to AENV in late March
- No adverse effects on soil quality have been observed

SUNCOR ENERGY

Environmental Monitoring

Wildlife Monitoring

- Ongoing wildlife monitoring program
- Wildlife surveys are conducted at three-year intervals following baseline sampling (i.e., 2001, 2004,2007), then at five-year intervals (2012, 2017, etc.)
  - The exception is beaver surveys, which are conducted annually (starting in 2002) in co-ordination with the surface water sampling
- The survey schedule permits monitoring of responses to potential development activities over the short, medium, and long term
- To date, no measurable effects on wildlife indicator species

SUNCOR ENERGY

Environmental Monitoring

- LDAR Monitoring
  - follows the *CCME: Environmental Code of Practice for the Measurement and Control of Fugitive Volatile Organic Compound Emissions from Equipment Leaks,* along with requirements from *EPA's Method 21 – Determination of Volatile Organic Compound Leaks.*
  - 6,358 potential sources monitored
  - 54 leaks (>10,000ppm) identified in 2009
  - LDAR monitoring for 2010 completed in mid August, 2010.

Environmental Monitoring

- Wetland Monitoring
  - Annual wetland monitoring completed for 2010
  - Monitoring consists of collecting surface water samples and water level measurements at 7 distinct sites
  - To date, no effects on wetlands have been observed

Participation in the following Regional Initiatives

OSDG – Oil Sands Development Group	**CONRAD – Canadian Oil Sands Network for Research and Development**
CAPP	**Athabasca Oil Sands (AOS) Regional Groundwater Initiative**
Oil Sands Spill COOP Area Y	**Alberta Biodiversity Monitoring Institute**
Alberta Caribou Committee (ACC)	**CEMA – Cumulative Environmental Management Association** •Board •Management Committee (MC) •NSMWG - NOx SO2 Management •SWWG – Surface Water •RWG – Reclamation •SEWG – Sustainable Ecosystems •TMAC WG - Trace Metal & Air Contaminants
WBEA – Wood Buffalo Environmental Association •AATC – Ambient Air Technical Committee •TEEM - Science Committee •Human Exposure - Human Exposure Monitoring Program	**Wildlife Corridor – Regional Work**
RAMP – Regional Aquatics Monitoring Program	**Athabasca Tribal Council**

SUNCOR ENERGY

Reclamation

- 2009 C&R report submitted the end of March 2010
- A Reclamation coordinator has been hired for In-Situ operations to develop and implement reclamation activities
- Total area of land cleared in 2009 was approx. 6.18 ha including:
  - Area around the MacKay River Camp
  - The expansion of a remote sump next to Pad 40
- Total area of projected land cleared in 2010 is 15 ha.
- No areas were reclaimed in 2009

SUNCOR ENERGY

Regulatory Compliance

- Suncor Energy is in compliance with all regulatory approvals, decisions, regulations and conditions as described in Decision Report 2000-50; specifically pertaining to:
  - Plant and waste management facility location
  - Ground level ozone and VOC monitoring
  - Groundwater monitoring wells
  - Surface water quality monitoring, and
  - Participation in Regional Initiatives

Summary of Key Learnings (Operations)

- Modifications and operational improvements of the ZLD dryer
- Significant potential for inlet produced fluid pipe fouling
- Frequent heat exchanger cleaning to manage fouling
- Monitoring and standardizing of operational procedure for desanding and Interface Draw-off System (IDS)
- Kill fluid ($CaCl_2$) has potential to impact downstream operations including water treatment and BFW
- Improved operation of Newalta processing lime-sludge from WLS

SUNCOR ENERGY

Future Plans

Project Description	Comments	Status
Completion of Phase 5 development	Installation of new facility at Pad 25 and tie-in of Pad 24/25 wells to MR1 via above ground distribution/gathering pipeline system.	Phase 5 a approved. Notification for Phase 5b submitted – Facility and pipeline licences Q4 2010.
MR1 De-bottlenecking	Equipment modifications to increase production from 33K bbl to 40K bbl	Plan for submission Q1 2011
MacKay River Production Increase	Increase in total MacKay River production from 73K to 80K bbl.	Jan/Feb 2011 or Fall 2011 (application submitted either with MR1 optimization application or with MR2 CPF amendment application.
MacKay River 2 (MR2)	Formerly known as MacKay River Expansion Project. Combining of ADAs for all or several sections of Dover with MacKay River.	Pending corporate and regulatory approvals - Q1 2011.
MR2 Central Processing Facility Amendment	Amendment to 2005 MRE approval application (current approval) due to possible process modifications.	Pending corporate and regulatory approvals - To be confirmed but targeting Fall 2011

SUNCOR ENERGY


SUNCOR
ENERGY