



**Presented by**

**Waterloo North Hydro Inc.**

**USE OF BY-PASS DEVICES AT  
PRIMARY METERING UNITS  
(PMU)**



## THE PROBLEM

- Ø HISTORICALLY BY-PASS DEVICES HAVE BEEN USED BY LDC'S TO MAINTAIN ELECTRICAL SUPPLY TO CUSTOMERS WHEN PRIMARY METERING UNITS ARE OUT OF SERVICE.
  
- Ø THERE ARE NO PROVISIONS FOR THE USE OF LOAD BY-PASS DEVICES IN THE CURRENT IESO MARKET RULES.
  
- Ø HOW DO WE MEET THE NEEDS OF THE LDC AND THE IESO?



## WHOLESALE METERING INSTALLATIONS

Ø PRIMARY METERING UNITS INSTALLED ON DISTRIBUTION LINES

RACK MOUNTED I.T's



3/15/2006

OIL FILLED TANK





**27.6 kV PMU**



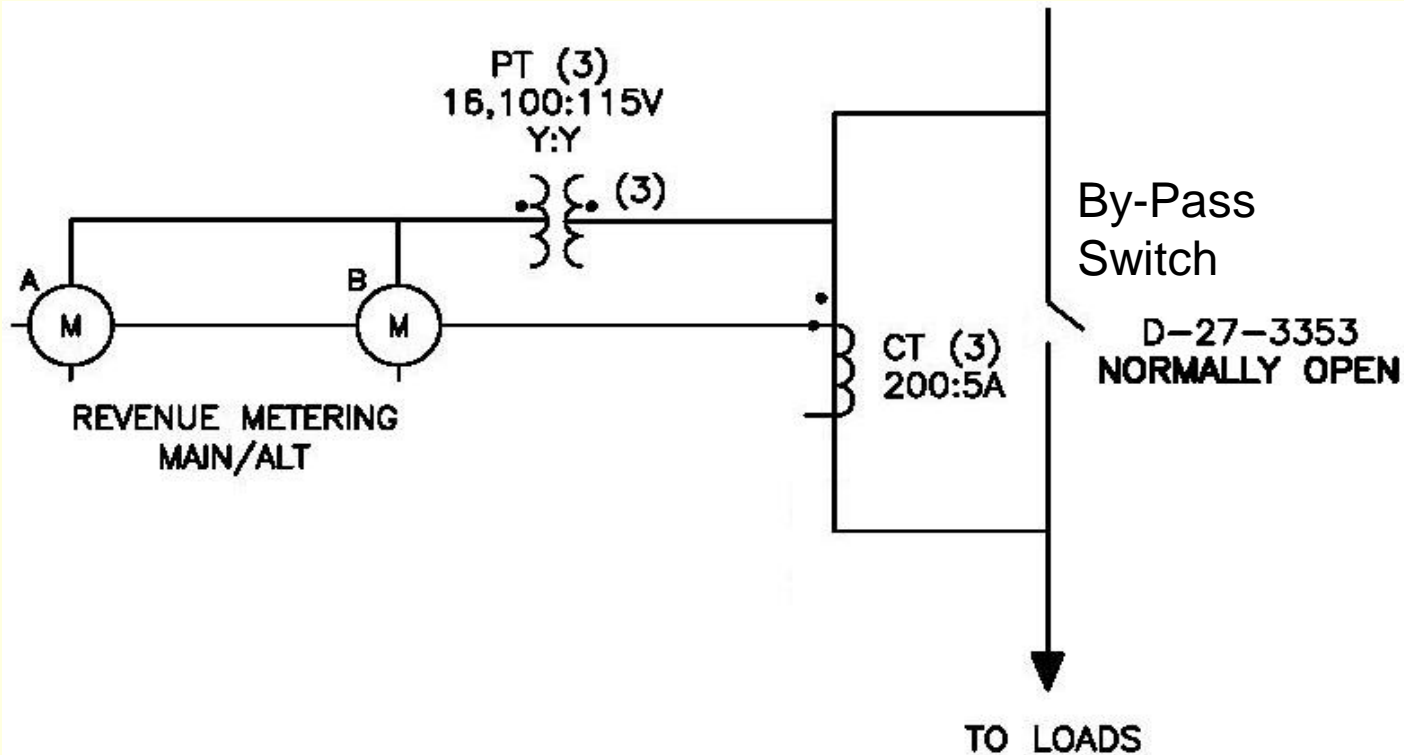
**44kV PMU**





## WHAT IS BYPASS ?

∅ THE ABILITY TO DIVERT PART OR ALL OF THE LOAD CURRENT AROUND THE WHOLESALE METERING POINT.

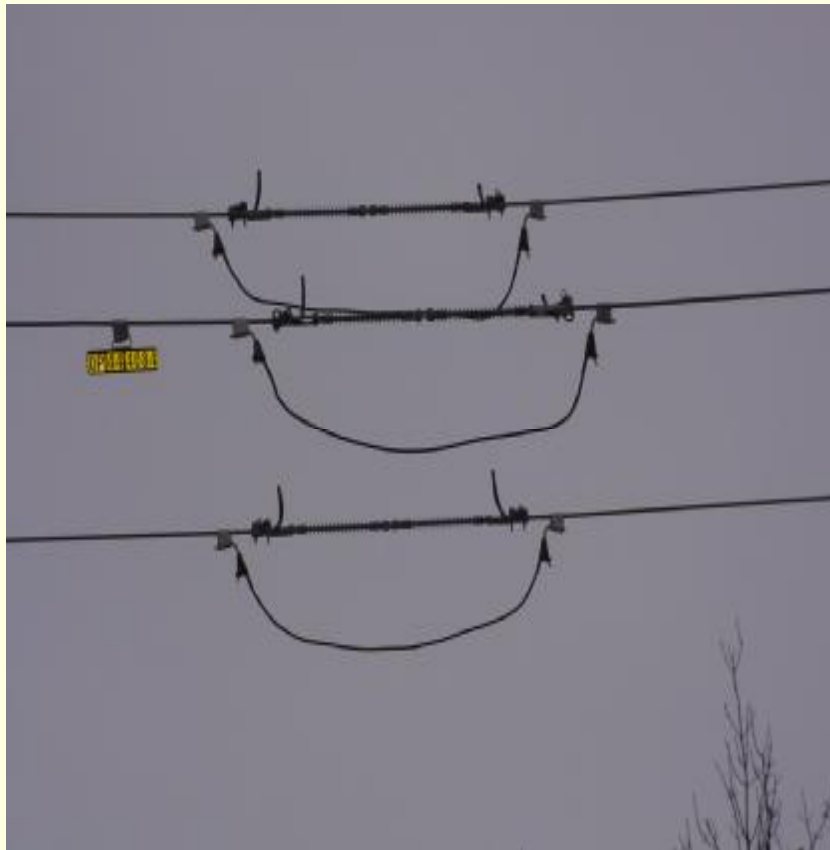


**Is MI subject to Power Switching (Y/N) - YES**



## MOST COMMON TYPES OF BY-PASS DEVICES

### IN-LINE OPENERS (MSO's)



### SOLID BLADE DISCONNECTS



3/15/2006



FUSED DISCONNECTS



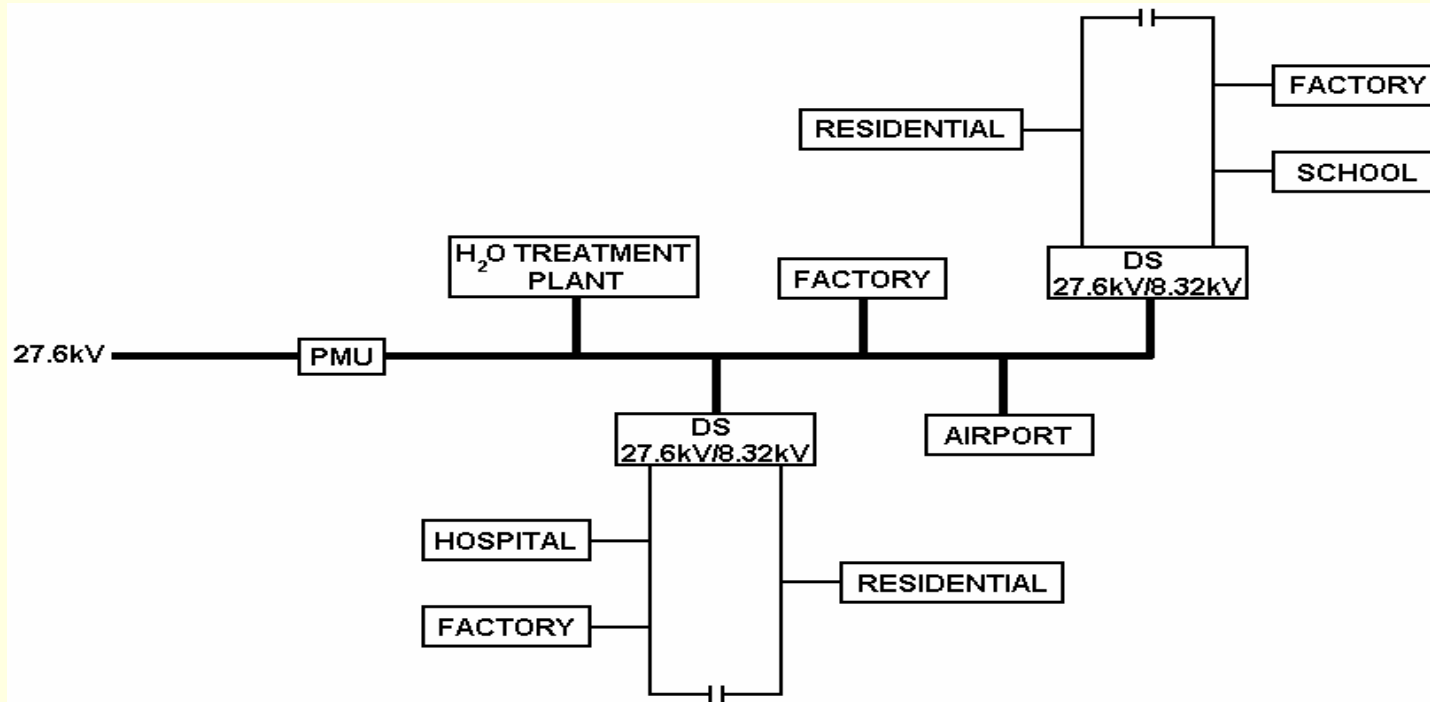
FUSED DISCONNECTS





## WHY IS BY-PASS REQUIRED? - SCENARIO ONE

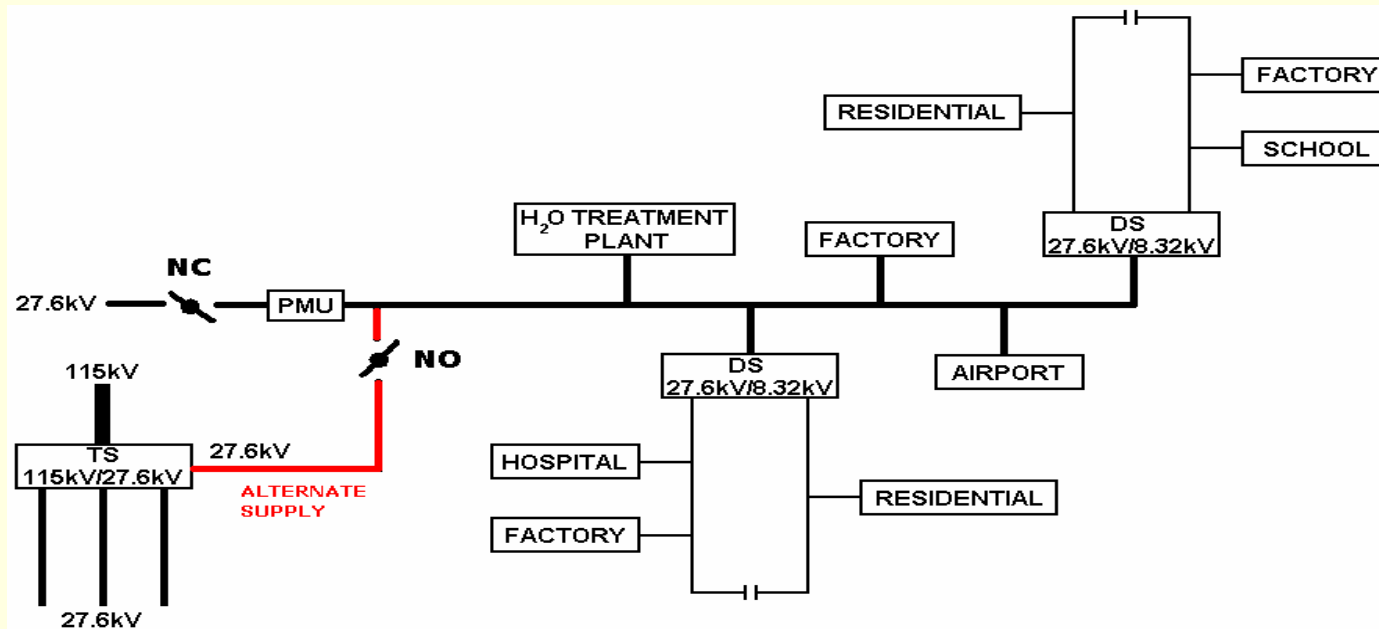
- ∅ PMU LOCATED ON A RADIAL FEEDER WITH NO ALTERNATE SOURCE OF SUPPLY. (COMMON TO MANY RURAL LOCATIONS)
- ∅ FEEDER OUTAGE IS REQUIRED UNLESS PMU IS BY-PASSED.





## WHY IS BY-PASS REQUIRED? - SCENARIO TWO

- ∅ FEEDER CAN BE SUPPLIED FROM AN ALTERNATE SOURCE.
- ∅ ISOLATION POINTS ARE NOT ALWAYS ON EITHER SIDE OF PMU. TO DO SO WOULD DRAMATICALLY INCREASE COST (+\$30k) AND CAUSE PROBLEMS IN SOME LOCATIONS.





## **THE NEEDS**

### **∅ IESO**

- ∅ ENSURE THE INTEGRITY OF THE WHOLESALE METERING SYSTEMS.
- ∅ IDEALLY NO POSSIBILITY OF BY-PASS.
- ∅ ALTERNATIVELY, HAVE ADEQUATE CONTROLS IN PLACE.

### **∅ LDC**

- ∅ MAINTAIN SUPPLY TO CUSTOMERS.
- ∅ PRIMARY METERING UNITS HAVE TO BE TAKEN OUT OF SERVICE FOR MAINTENANCE, FAILURE / REPAIR, UPGRADE.
- ∅ WORK NEEDS TO BE COMPLETED SAFELY.



**PROBLEMS WITH TEMPORARY  
BY-PASS DEVICES ?**

- Ø REQUIRES THE INSTALLATION OF FLEXIBLE JUMPERS WITH LIVE LINE TOOLS IN VERY TIGHT LIMITS TO ENERGIZED CONDUCTORS AND GROUNDED COMPONENTS.
- Ø POTENTIAL OF CONTACT HIGH.
- Ø EXPOSURE TO A FLASH HIGH.
- Ø SOLUTION MOST OFTEN IS TO ISOLATE AND INTERRUPT CUSTOMERS.





## WHY PERMANENTLY INSTALLED BY-PASS DEVICES ?

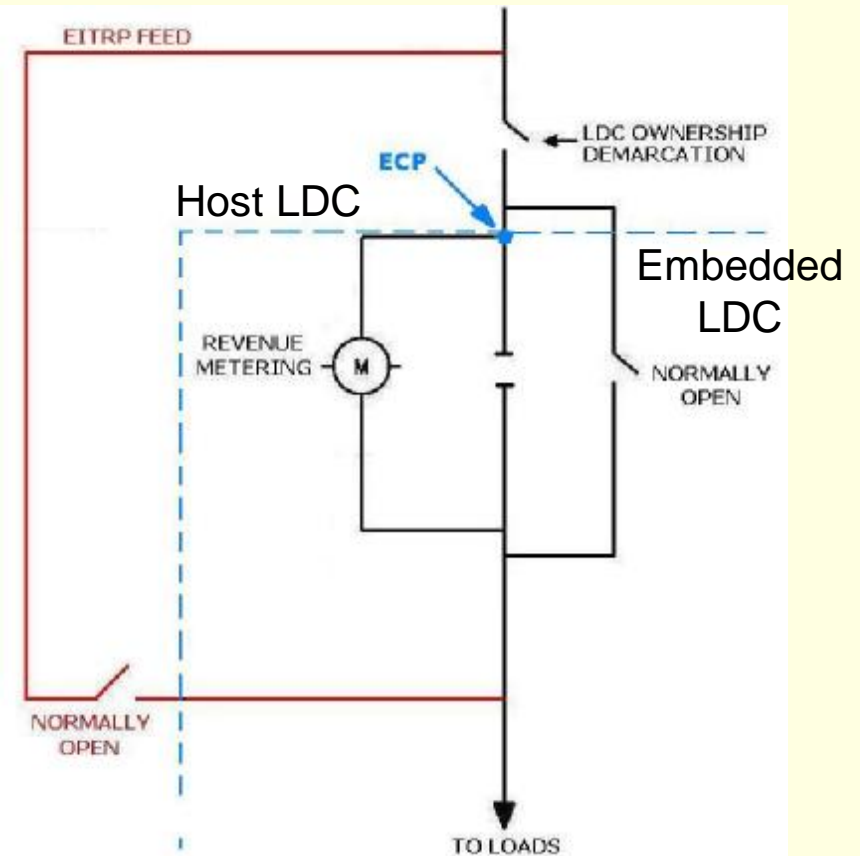
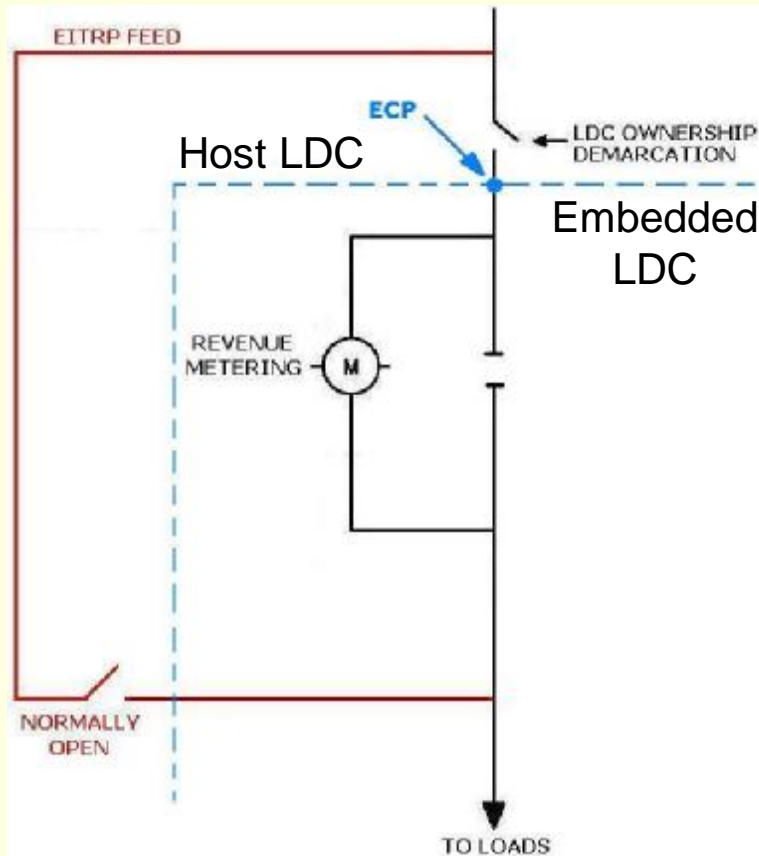
- Ø PRIMARILY SAFETY.
- Ø BY-PASS WILL BE NEEDED AT SOME POINT IN TIME.
- Ø BY-PASS SWITCHES PROVIDE FOR QUICKER ISOLATION OF PMU – CUSTOMER OUTAGE NOT REQUIRED.
- Ø GREATER DISTANCE BETWEEN LINEPERSON AND BY-PASS SWITCHES CAN BE MAINTAINED DURING HOT STICK OPERATIONS WHEN OPENING OR CLOSING.





NO BY-PASS AT PMU  
EMERGENCY TIE BETWEEN  
HOST & EMBEDDED LDC

BY-BASS AT PMU IS THE SAME  
AS EMERGENCY TIE BETWEEN  
HOST & EMBEDDED LDC





## **THE CONTROLS**

- ∅ ENSURE THE INTEGRITY OF THE WHOLESALE METERING SYSTEMS; HOWEVER, USE OF BY-PASS AT PMU NO DIFFERENT THAN USE OF EMERGENCY TIES BETWEEN LDC'S. USE SAME CONTROLS.
  - ∅ LDC TO HAVE AN AGREEMENT WITH THE HOST FOR USE OF BY-PASS DEVICE.
  - ∅ LOAD ESTIMATION AGREEMENT IN PLACE FOR USE AND SETTLEMENT BETWEEN HOST AND LDC. DEPENDING ON THE BY-PASS DURATION, USE CLAMP-ON RECORDING AMMETERS OR HISTORICAL DATA.
  - ∅ SUFFICIENT NOTICE WILL BE GIVEN BY THE LDC TO THE IESO AND HOST BEFORE OPERATION OF BY-PASS DEVICE.
  - ∅ BY-PASS DEVICE TAGGED WHEN IN THE CLOSED POSITION.



**THE CONTROLS (CONTINUED)**

- ∅ IDENTIFICATION OF THE BY-PASS DEVICE ON SINGLE LINE DIAGRAM (SLD).
- ∅ DETECTION OF BY-PASS AT THE PMU
  - ∅ FEEDER PHASE CURRENT REGISTRATION DROPS TO AN ABNORMAL LEVEL (APPROXIMATELY <20% OF NOMINAL LEVEL). ALL NEW MAIN METERS RECORD I2H PER PHASE AND AS SUCH THE LOAD DROP CAN BE FLAGGED IN MV90.
  - ∅ LOW I2H THRESHOLD LIMITS MAY RESULT IN SOME FALSE POSITIVE READINGS AND ADDITIONAL MTR'S.
  - ∅ OPERATION OF THE BY-PASS IS NOT ACCESSIBLE TO MOST PEOPLE AND CANNOT BE INADVERTENTLY OPERATED. DEVICE OPERATION REQUIRES BUCKET TRUCK AND QUALIFIED PERSONNEL.
  - ∅ THE BY-PASS DEVICE CAN BE VISUALLY VERIFIED IN THE OPEN/CLOSE POSITION.



**RECOMMENDATION**

Ø WITH APPROPRIATE CONTROLS IN PLACE, THAT PERMANENT BY-PASS MECHANISMS BE ALLOWED AS PART OF WHOLESale PRIMARY METERING UNIT INSTALLATIONS AT EMBEDDED LOCATIONS.



QUESTIONS ?