City and Borough of Sitka

Electric Department
105 Jarvis Street, Sitka, Alaska 99835
(907) 747-4000, FAX (907)747-3208
www.cityofsitka.com

Robert E. Dryden, P.E., System Engineer, (907)747-1885

2 June 2010

REF: Medvijie Substation Work Required

This substation is located at the NSRAA Medvijie Hatchery, about halfway between the Blue Lake Hydro and the Green Lake Hydro on the Green Lake access road. The only customer served is the hatchery.

For several years the insulating oil tests done on these transformers indicate arcing or insulation failure within the units. In the spring of 2008 one transformer failed and was replaced by the spare. We now have no spare and the oil tests on the remaining units are worse than the unit that failed. We have no equipment to serve the hatchery if another unit fails.

I have, over the last two years, contacted all the custom substation transformer manufacturers, Kulman, Cooper, ABB, etc. and got the response that, in this 69 kV voltage, they would not build any unit smaller than 5,000 kVA. I have also shopped the used/reconditioned market for single phase or three phase units and find that the smallest units available are 5000 kVA. The existing bank is 1500 kVA and the hatchery load is only 150 kVA.

Viginia Transformer was finally responsive to a request for a more reasonable size and has offered us a very high quality 2 MVA substation class unit for a budgetary cost of about $130,000. This is a single three phase unit similar to what we have in Jarvis and Industrial Park Substation but smaller. We have four large Virginia Transformers in our system.

On the 69 kV side is an open disconnect switch and 5 amp high voltage fuses. The high voltage transformer 69 kV winding are connected delta on the high side and the 7200 volt side is connected in a 7.2/12.47 kV grounded wye. A set of three overhead type 167 kVA transformers are connected 7.2/12.47 kV on the high side and feed the hatchery load with 277 volt windings connected into a grounded wye 480/277 configuration.

The work I see as essential:

1. Purchase a new transformer as noted above, 69 kV x 7.2/12.5 kV. Purchase a new padmount transformer to drop from the 7.2/12.5 voltage to the hatchery service voltage of 277/480 grounded wye.

2. Completely wreck out the substation leaving only the fence and high voltage switch and fuse structure and possibly the 69 bus and deadend structure. The area will be leveled with D-1 crushed rock and new pads installed for the two transformers. These would be fiberglass types so that we would not have outage delay working with concrete pads.

3. Upgrade the wire size on the 69 kV side. All conductor handling 69 kV should be 1/0 ACSR or larger. There is a lot of #6 copper, which is predicted to cause corona loss and radio noise at 69 kV.

4. The 69 kV conductors should be tightened up to help keep the H frame supporting the 69 kV switch from twisting. Downguys should be added on the opposite end of the bus to stabilize the H frame adequately.

5. The 69 kV switch needs to be replaced. We will probably put up a set of Royal Vee switches of the same type we are using in the substations and ring bus project.

6. The gate and fencing needs to be worked over a little. The gate is very difficult to open close and lock.

7. We expect that this work will take about six crew days and the diesel generator at the hatchery will need to operate the hatchery for about a week. If that unit were to fail we could borrow a trailer mounted generator to power them up from the Wastewater Dept.

The delivery time on the transformer is about 20 weeks and I feel we should move forward rapidly because a failure of another transformer would put the site on diesel. The untily would be expected to pay for the diesel fuel and operating cost. This site is very critical to the economy of this City.

I attach a cost estimate showing a total for this upgrade at about $205,000.

Robert E. Dryden P.E.

Enclosed : Photos-2, Cost Estimate

Medvigie Substation Upgrade 2010
Cost Estimate

Item #	Description	Unit	Cost/Unit	# Units	Ext Price	Shipping	Subtotal
*** Materials							
1	Power Transformer	ea	$130,000	1	$130,000	$7,500	$137,500
2	Padmount Transformer	ea	$9,000	1	$9,000	$500	$9,500
3	69 kV Vee Switch	set	$5,000	1	$5,000	$1,000	$6,000
4	Fiberglass Arms	ea	$800	2	$1,600	$500	$2,100
5	Misc Insulator, hardware, wire, bolts, etc.	lot	$4,000	1	$4,000	$0	$4,000
6							$0
						Subtotal Materials ---	$159,100
***Wreck out Existing Substation							
7	Labor to wreck out substation 4 linemen + equip	day	$2,400	3	$7,200	$7,500	$14,700
8	Excavator	day	$500	3	$1,500	$500	$2,000
9	Misc. Equipment	day	$300	3	$900	$1,000	$1,900
10	D-1 crushed rock delivered to site.	yd	$45	20	$900	$500	$1,400
11					$0	$0	$0
						Subtotal Wreck Out ---	$20,000
*** Install pads and set transformers							
12	Labor to iinstall pads and set trans 4 linemen	day	$2,400	1	$2,400	$7,500	$9,900
13	Excavator	day	$500	1	$500	$500	$1,000
14	Misc. Equipment	day	$300	1	$300	$1,000	$1,300
15	Crane $1500/day	day	$1,500	1	$1,500	$500	$2,000
16					$0	$0	$0
						Install pads and Transformers ---	$14,200

*** Hook up Substation and Re-energize

17	Labor to hook up substation 4 linemen + equip	day	$2,400	1	$2,400	$7,500	$9,900
18	Excavator	day	$500	1	$500	$500	$1,000
19	Misc. Equipment	day	$300	1	$300	$1,000	$1,300
20					$0	$0	$0
						Subtotal Hook Up and Energize ---	$12,200
						Project Total	$205,500

Note: Labor - assume 8 hour days, 4 men on the crew, $75/hr,
Excavator $500/day
Crane $1500/day
Engineering is done in house.
No Cost contingency is offered.

Robert E Dryden PE
System Engineer
2-Jun-10


DANGER
HIGH
VOLTAGE
DELTA
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