

DRAFT Candidate Sites for the NOvA Far Detector: Orr-Buyck Road

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August 15, 2005

1.0 Site Criteria

The site selection criteria for the NOvA Far Detector are:

- a. At an appropriate distance from the NUMI beam centerline, i.e. 11.5 to 12.0 km
- b. As far as possible from Fermilab
- c. In the United States
- d. Near a paved highway with installed electrical power and telecommunications utilities
- e. Elevated above the water table to enable sinking the detector into the ground
- f. No environmentally or culturally sensitive features

2.0 Orr-Buyck Road Site

The Orr-Buyck Road (St. Louis County Highway 23) is the second most northern east-west road in the United States in the vicinity of the NUMI beam. It runs roughly east-west from its intersection with U.S. Highway 53 at Orr to Buyck, a distance of about 15 miles. Then road then turns north for another 15 miles and ends at Crane Lake, MN, a port of entry for non-highway traffic. The mostly unpaved Echo Trail runs east from the Orr-Buyck Road, just north of Orr, about 50 miles to Ely MN. Electrical power (~1,000 kVA excess capacity, Minnesota Power) and fiber optic telecommunications (Frontier Telephone) are both available along the entire length of the Orr-Buyck Road. The power is single-ended from the west end at Orr.

The Orr-Buyck Road is located about 50 north of Virginia, MN and 50 miles south of International Falls MN. The area is lightly populated, but there are small urban centers with 500-1,000 people at Orr and Cook. Services available in these towns include supermarket, gas stations, restaurants, motels, bank, etc. There is an airport with a paved runway and instrument approach at Orr. The nearest commercial air service is at International Falls. Orr is a listed station on the Canadian National Railway.

The NOvA Far Detector site at the appropriate off-axis distance lies near the intersection of the Orr-Buyck Road with the Elbow Lake Forest Trail, a two-lane, well-maintained gravel road. The apparent best site is on the east side of the Elbow Lake Forest Trail, ~300 m south of its intersection with the Orr-Buyck Road. The land in this area rises rapidly from the Elbow Lake by ~30 m as one traverses towards the east. A site at the top of the ridge appears to have no wetlands. The site has mixed forest, some areas of which have been recently cut. It has some soil, some rock outcrops and some erratic boulders. The terrain elevation suggests a possible direct access to the laboratory floor by a short road off the Elbow Lake Forest Trail.

The entire site is tax-forfeit, owned by the State of Minnesota and administered by the St. Louis County Land Department. The site is in Section 26, T65N, R18W, St. Louis County, Minnesota, in particular, the SE ¼ section lying east of Elbow Forest Trail, along with the Ne ¼ of the SW ¼, also lying east of Elbow Lake Forest Trail. The total site could be as large as ~160

acres. The center of the detector is approximately 92.612° West longitude and 48.082° North latitude. It lies ~ 775 km from Fermilab and ~ 11.8 km off-axis.



