

**EXHIBIT #E1  
ENGINEERING STATEMENT**

Concerning the Application of  
Washington State University  
to Construct a New Educational FM station  
to Serve Chehalis, Washington

February 1996

**Channel 205C3**

**1 kW Vert. & .1 kW Horz.**

This engineering statement supports the application by Washington State University to construct a new non-commercial educational FM station to serve Chehalis, Washington.

Under the instant proposal, a type approved transmitter produces an output power of 1.2397 kilowatts. The 7/8 inch, Andrews HJ5-50 transmission line, has an efficiency for its 45.7 meter length (150') of 88.7 percent. This applies a total of 1.1 kilowatts to the input of the antenna array. Since the antenna will radiate the horizontal field at ten percent of the vertical field, a splitter delivers 1 kilowatt to the vertical element and .1 kilowatt to the horizontal element.

**Tower and Site:**

Exhibit # E2 is a vertical sketch showing the existing authorized tower (FAA # 82-ANM-068-OE) and the proposed side-mounted antenna. The FAA has been notified as to the specifics of this proposal.

**Studio location:**

Exhibit # E3 is an explanation of the applicant's need to locate the studio outside the 70 dBu coverage contour. This exhibit was prepared by Washington State University staff.

**Intermodulation and blanketing:**

Exhibit # E4 is an exhibit describing the possible effects of intermodulation and blanketing.

**Site Map:**

Exhibit # E5 is full scale section of a 1:24,000 U.S. Geological Survey topographic quadrangle map (Curtis Quadrangle), Washington showing the exact transmitter location. Page # 2 of this exhibit is a photo-reduction of the entire map.

### **Coverage Map:**

Exhibit # E6 is a map of the proposed 1 mV/m (60 dBu) service contour which shows the eight cardinal radials. This map was computer generated using U.S. Geological Survey Digital Line Graph data which was originally digitized from 1:2,000,000 scale maps. A total of 360 evenly spaced radials were used to plot the 60 dBu contour. Distances to contours were determined using the Commission's own TVFMINT subroutine which extracts F(50-50) and F(50-10) signal distances from an input of power and antenna height above average terrain. The political boundaries of Chehalis, Washington, the city of license, are shown to be fully encompassed by the proposed 60 dBu city service contour. The area within the proposed 60 dBu contour amounts to 3,114.2 square kilometers. This figure was determined by averaging the distance to the 60 dBu contour along 360 evenly spaced radials. The resulting average was used in the following formula to determine the area within the contour:  $Area = \pi R^2$ . The population within the 60 dBu service contour was determined to be 60,927 people through the use of a computer program which extracts a population count based on population centroids defined by U.S. Census 1990 (PL-94-171) digital census data. This program draws data from the following summary level: State-County-Voting District/Remainder-County Subdivision, Place/Remainder-Census Tract/Block Numbering Area-Block Group.

A total of 36 evenly spaced radials were used to determine the antenna height above average terrain. The N.G.D.C. 30 arc second database (TGP-0050) was used to determine the radial elevations at .1 kilometer increments from 3 to 16 kilometers. The points were then averaged using the required four-point interpolation method and the average was employed to project antenna heights above average terrain and the consequent distances to signal contours along the pertinent radials. (See a tabular listing of these contour distances on page #4 of this exhibit.)

### **Allocation Study:**

Exhibit # E7 is an allocation table showing the proposed station's 1 mV/m protected signal contour free from overlap which would cause interference as per Sec. 73.509 of the Commission's Rules and Regulations. The print-out lists the distances between the relevant protected and interfering contours of the proposed facilities and those stations which have both a frequency and distance relationship. Page #2 of the exhibit is a narrative on how the study was performed and on the conventions used for interpreting the information.

The study shows that no interference is caused to or received from full service FM stations, construction permittees or applicants.

The proposed facility is located within 320 miles from the US

border with Canada. Channel 205 is co-channel with a class C allocation for Saturna Island, BC. Though the treaty spacings between a co-channel Canadian class C and a US class C3 require a distance of 259 kilometers the distance is only 246.86. Page # 3 is an allocation map showing that the proposed facility neither receives interference from nor causes interference over Canadian soil to the proposed allocation. The allocation's interference and protected signals have been predicted on the basis of a full class C operation, ie. 100 kW at 600 meters HAAT. Concurrence with the Canadian authorities is required.

Page #4 of this exhibit is an allocation map showing the relationship between first adjacent KMHD in Gresham, Oregon.

There are no pertinent I.F. relationships.

**Channel-six interference protection:**

The proposed facility is found to be 118.17 kilometers from KOIN (TV-6), Portland, Oregon. This places the proposed facility's transmitter site within the grade B contour of KOIN. There are no other channel-six TV stations within the cutoff distance as defined in Sec. 73.525 of the Commission's rules.

Exhibit # E8 contains a detailed channel-six narrative and map showing that interference will not be caused KOIN-TV such that more than 3,000 people will be affected.

**R.F. Hazard compliance:**

Exhibit # E9 shows compliance with the Commission's R.F. radiation standards.

Page # 5 of this exhibit (#E1) is a statement made by the preparer, Doug Vernier, attesting to his qualifications.

TERRAIN AND CONTOUR DATA  
 Washington State University  
 Chehalis, Washington

Exhibit # 14  
 Washington State University  
 Page 4 of 6

ERP = 1 kW  
 FM - 2-6 Tables 30 Sec

Azimuth Deg T.	Ave. Elev. 3 to 16 km Meters AMSL	Effective Antenna Height Meters AAT	ERP (dBk)	F(50-50) Distance to 60 dBu Contour km
0	137.8	337.2	0.000	33.2
10	121.3	353.7	0.000	34.0
20	84.9	390.1	0.000	35.6
30	90.7	384.3	0.000	35.4
40	97.5	377.5	0.000	35.1
50	103.7	371.3	0.000	34.9
60	119.7	355.3	0.000	34.1
70	132.4	342.6	0.000	33.5
80	139.7	335.3	0.000	33.1
90	157.4	317.6	0.000	32.2
100	171.6	303.4	0.000	31.4
110	183.9	291.1	0.000	30.8
120	178.5	296.5	0.000	31.1
130	156.9	318.1	0.000	32.2
140	175.2	299.8	0.000	31.2
150	195.4	279.6	0.000	30.2
160	173.0	302.0	0.000	31.3
170	149.8	325.2	0.000	32.6
180	151.6	323.4	0.000	32.5
190	152.9	322.1	0.000	32.4
200	195.9	279.1	0.000	30.1
210	267.6	207.4	0.000	26.1
220	283.2	191.8	0.000	25.2
230	309.4	165.6	0.000	23.6
240	345.5	129.5	0.000	21.1
250	256.3	218.7	0.000	26.8
260	213.7	261.3	0.000	29.2
270	157.2	317.8	0.000	32.2
280	170.8	304.2	0.000	31.5
290	166.6	308.4	0.000	31.7
300	141.1	333.9	0.000	33.0
310	124.8	350.2	0.000	33.9
320	143.2	331.8	0.000	32.9
330	145.5	329.5	0.000	32.8
340	143.2	331.8	0.000	32.9
350	143.1	331.9	0.000	32.9
Ave. = 168.9 M		306.1 M		

Antenna Radiation Center AMSL = 475.0 M

Geographic Coordinates:

North latitude: 46 33 18  
 West longitude: 123 03 25

Exhibit #E1, Pg #5

**Declaration:**

I, Doug Vernier, declare that I have studied engineering at the University of Michigan and have received degrees from the University in the field of Broadcast Telecommunications. That, I been active in broadcast consulting for over 23 years;

That, I have held a Federal Communications Commission First Class Radiotelephone License continually since 1964. In 1985 this license was reissued by the Commission as a lifetime General Radiotelephone license no. PG-16-16464;

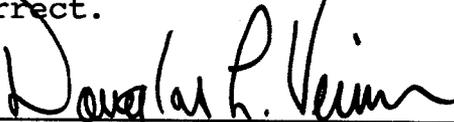
That, I am certified as a Professional Broadcast Engineer (#50258) by the Society of Broadcast Engineers, Indianapolis, Indiana. (Recertified 11/95.)

That, my qualifications are a matter of record with the Federal Communications Commission;

That, I have been retained by Washington State University, Pullman, Washington to prepare the engineering showings appended hereto;

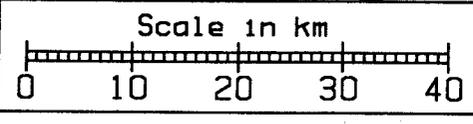
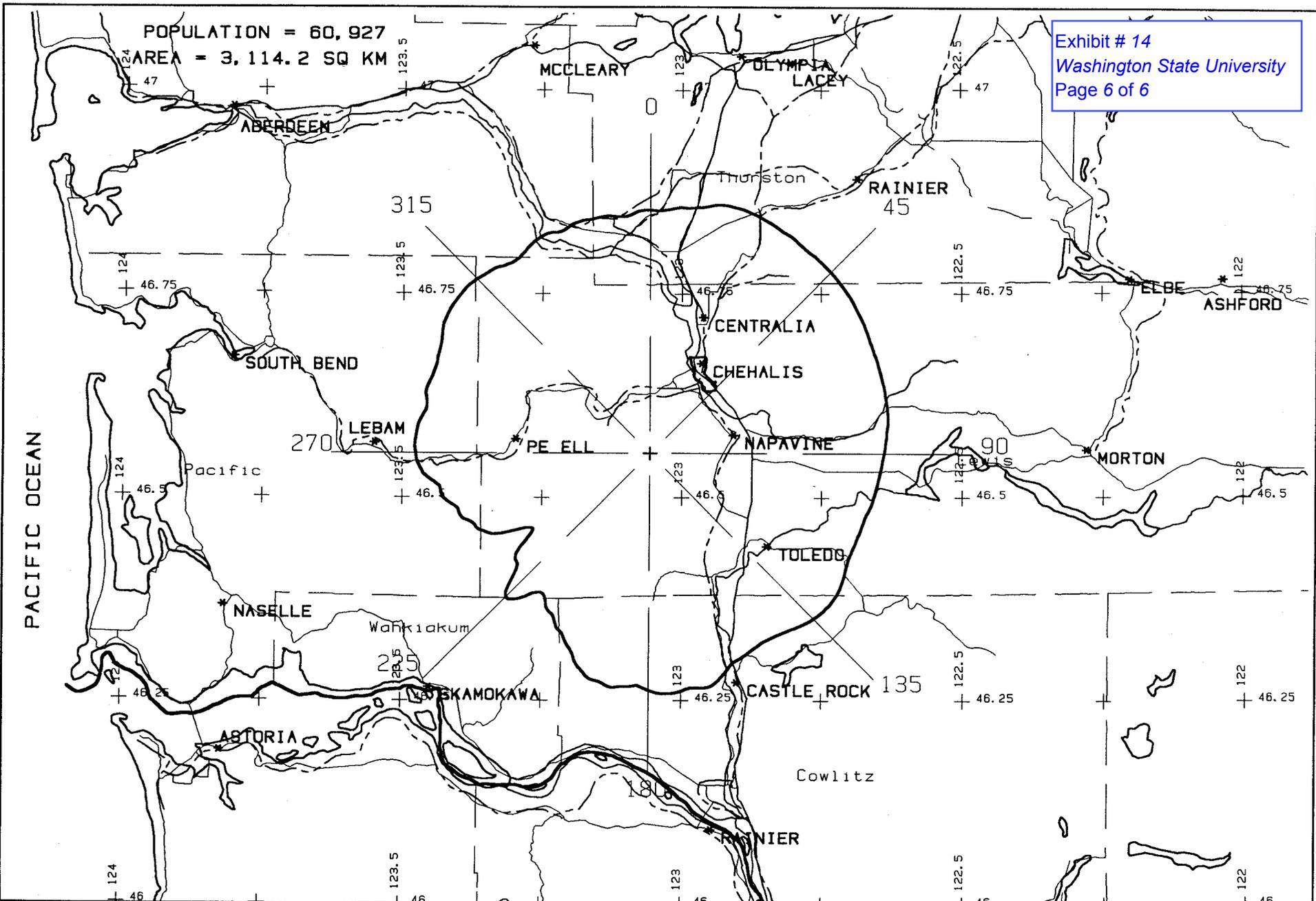
That, I have prepared these engineering showings, the technical information contained in same and the facts stated within are true of my knowledge;

That under penalty of perjury, I declare the that the foregoing is correct.



Douglas L. Vernier

Executed on February 29, 1996



CH 205C3 1kW (Vert), .1 kW (Hor)  
Washington State University

60 dBu COVERAGE  
D. Vernier - 01/96