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B. W. St. Clair

Comprehensive Technical Exhibit

Amendment of Application for NCE-FM Construction Permit

88.3 MHz, Channel 202, Casper, WY
NEW, FCC ID 92997
FCC File Number BPED-19990311MN
WCN, Inc., Applicant

Amendment of pending application. This amendment seeks to modify features of the within-captioned application with respect to the following: Transmitter location, ERP, use of vertical antenna polarization only. The purpose of the modifications are to allow coexistence with KPTW, channel 6, and to provide improved coverage of the community.

Directory of Sections and Questions revised.

"Section VII - FM Engineering..."

Tech Box items:

- 2: Station Class changed from A to C3.
3. Antenna location (NAD 27) revised from 42-51-01 N, 106-19-29 W to 42-44-26 N, 106-21-34 W.
5. Antenna location site elevation above mean sea level revised from 1561 meters to 2444 meters.
6. Overall tower HAGL remains at 43 meters, but is different tower, unregistered.
7. Radiation Center HAGL revised from 39 meters to 20 meters.
8. HAAT revised from -101 meters to 524 meters.
9. ERP toward Radio Horizon revised from 0.74 kW H and V to 0.0 kW H, 0.5 kW V.

Additional part VII items:

13. Interference - this Comprehensive Technical Exhibit deals with the issues of potential interference and environmental issues associated with the changes proposed by the within amendment. Please see exhibit items as appropriate.

Contour overlap Requirements. §73.509 requires that protected F50, 50 /interfering F50, 10 contours of the proposed facility not intersect with corresponding interference/protected contours of other facilities as follows:

Co-channel.....	0.1mV/m (40 dBu) ..	1 mV/m (60 dBu)
	1 mV/m (60 dBu)...	0.1 mV/m (40 dBu)
200 kHz.....	0.5 mV/m (54 dBu) ..	1 mV/m (60 dBu)
	1 mV/m (60 dBu)1..	0.5 mV/m (54 dBu)
400 kHz/600 kHz.....	100 mV/m (100 dBu)	1 mV/m (60 dBu)
	1 mV/m (60 dBu)...	100 mV/m (100 dBu)

Potentially interfered/interfering facilities and applications were considered. They are:

COCHANNEL:

BPED-19990310ML	FID 92951	Channel 202	Casper WY	DISMISSED 1/31/2005.
BMPED-20020321ABT	FID 88452	Channel 202	KTPT, Rapid City SD	CLEAR 40/60, CLEAR 60/40

+ 200 KHZ:

BLED-19850305KW	FID 10030	Channel 201	KCWC-FM,Riverton, WY	CLEAR 54/60, CLEAR 60/54
BNPED-20000119ABS	FID 122342	Channel 201	Gillette, WY	CLEAR 54/60, CLEAR 60/54

+ 400/600 KHZ:

BLED-20000803AAI	FID 89886	Channel 205	KYPR, Gillette, WY	CLEAR 100/60, CLEAR 60/100
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All others considered showed greater contour separation.

Spacing Requirements: Short spacing, as outlined in §73.207, with other facilities does not occur. Stations evaluated are:

COCHANNEL:

BMPED-20020321ABT	FID 88452	Channel 202	KTPT, Rapid City SD	Req'd 237 km, Actual 268 km
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+ 200 KHZ:

BLED-19850305KW	FID 10030	Channel 201	KCWC-FM,Riverton, WY	Req'd 89 km, Actual 192 km
BNPED-20000119ABS	FID 122342	Channel 201	Gillette, WY	Req'd 89 km, Actual 178 km

+ 400/600 KHZ:

BLED-20000803AAI	FID 89886	Channel 205	KYPR, Gillette, WY	Req'd 42 km, Actual 178 km
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+ 10.6/10.8 MHZ:

No facilities on channels 254 or 255 within 31 km, minimum distance C3 to C

Contour protection for short-spaced assignments or grandfathered short-spaced assignments. No affected stations were shown per §§73.213 or 73.215.

Television channel 6 protection. §73.525 requires that applications for NCE-FM stations on the reserved channels protect channel 6 facilities within distances defined by the table in §73.525(a)(1). For FM channel 202, that distance is 257 km. KPTW, FCC ID 82575, is licensed to Casper, WY, is within that distance.

Colocation with Channel 6. Because of the proximity of the referenced channel 6 facility, the within applicant has arranged, in accordance with §73.525(d), to colocate the within NCE-FM facility at a lower position on the same tower with the TV channel 6 facility with its center of radiation ten meters below the channel 6 transmitting antenna. Vertical radiation patterns of both the FM antenna to be used and the TV antenna are provided as shown on following pages. Neither antenna employs beam tilt. Both antennas are two bay antennas; the FM antenna shows significantly narrower vertical beamwidth than the TV channel 6 antenna. At all depression angles, the FM antenna vertical pattern does not exceed the TV antenna vertical pattern by more than 2 dB, as shown by tabulations attached with the vertical elevation patterns following. In accordance with the certification requirements of the Rulepart, the applicant, by signature on this application, certifies that the coordination between the FM and TV antennas as required by §73.525(d) and outlined above will occur at the time of construction of the facility.

Vertical polarization only of FM antenna. In order to provide greater resistance to interference, the FM facility will employ a vertical-only transmitting antenna. Diagrams and tabulations illustrating the vertical (elevation) beamwidths of both facilities are attached. Effective radiated power of the FM facility will be limited to 0.5 kW vertically polarized only will be employed. This is well below the 1.9 kW Table B limit in §73.525(d).

Difference in azimuthal antenna patterns. The choice to employ FM vertical polarization only derives from the difference in the horizontal (azimuthal) antenna patterns of the two facilities. The TV channel 6 facility employs a directional antenna - specifically, a 70° skewed array of two Kathrein/Scala CA-2 antennas with the center of the array at 0° True. The FM array is a Kathrein/Scala FMV-2 array and is nondirectional. Because of the differences in these patterns, small areas of potential interference are predicted to exist in which the F50, 50 channel 6 protected contours and the respective F50, 10 FM interfering contours intersect, despite colocation. These areas, as viewed from the transmitter site, are between the azimuths of 89° T. to 146° T. and from 199° T. to 271° T. and are in sparsely populated areas as shown below. To determine these locations of potential interference, the engineering chart in §73.599 was employed, which shows that FM channel 202 has a U/D ratio with respect to channel 6 of from -5.1 dB at the channel 6 90 dBu contour to +3.8 dB at the channel 47 dBu contour. Colocation requires that the 6 dB directional antenna correction factor not be used, as all affected receiving antennas will be pointed at the same location for both facilities. The full display of this portion of the analysis is shown on a following map illustration.

Effective Radiated Power used for calculations. The channel 6 facility has an ERP of 0.331 kW. The ERP of the FM for the purpose of the U/D calculations is 0.0125 kW and was derived as follows:

Mixed or vertical polarization antenna ERP calculations in cities of less than 50,000 are based on the following formula:

$$[H + (V/A)]$$

where H = the horizontally polarized ERP in kW;
 V = the vertically polarized ERP in kW;
 A = 40 if the interference area lies outside a city of 50,000 persons or more.
 Casper, WY population, 2000 census, is 49,644 persons.

thus, $[0.0 + (0.5/40)] = 0.0125 \text{ kW}.$

Television channel 6 protection. (continued)

Population affected by potential interference. Except as provided by §73.525(d), the colocation provision of the Rulepart, a new FM application may not propose a facility which causes predicted interference to more than 3000 persons to a channel 6 facility. With respect to the instant application, the population analysis is as follows. The transmitter location is on Casper Mountain, some 14 km south of Casper, WY and is located in a sparsely populated area. Areas to the south of the antenna location are virtually unpopulated. Using V-Soft Communications Probe 2 and Probe 3 software, the areas of potential interference are bounded by the 47 dBu protected contour of the channel 6 station and lines through a series of loci at which the protected contour of the channel 6 facility and the corresponding interfering contour of the within application intersect as illustrated on the map illustration earlier mentioned. Within this identified area, V-Soft 2000 U.S. census population data was used to determine a "worst case" potentially interfered population of not greater than 417 persons. Owing to the relatively narrow vertical beamwidth of the FM antenna, interfering contours are expected to be significantly reduced below the calculated levels at sites on the mountainside within nominal distances of the tower due to the additional signal reduction occurring at depression angles of more than 2° below horizon, which will further reduce the interfered population below the number cited.

Environmental Protection. The within application antenna is to be side-mounted on a tower in current use for communications services. The tower is less than 200' tall and does not employ high-intensity lighting. It is not in a protected area of archaeological/historical interest or on animal migration routes or preserves. It is not in a designated wilderness area or Indian religious site. Construction will not affect surface features of the region.

Insofar as nonionizing radiation is concerned, the site is colocated on a single tower with the following facilities of interest:

KUWC, FM channel 217, FCC ID 82539, BLED-20000707ACY. ERP: 0.53 kW H, 0.53 kW V.
For nonionizing radiation calculations, total ERP is 1.6 kW.
Transmit antenna is located with it C/R at 38 meters AGL.

KPTW, channel 6, FCC ID 82575, BPET-19960624KT. ERP: 0.331 kW H only.
For nonionizing radiation calculations, total ERP is 0.331 kW.
Transmit antenna is located with it C/R at 30 meters AGL.

The within proposal is:
FM channel 202, FCC ID 92997, BPED-19990311MN. ERP: 0.5 kW V only.
For nonionizing radiation calculations, total ERP is 0.5 kW.
Transmit antenna is located with it C/R at 20 meters AGL.

For the purpose of determining nonionizing radiation produced by each facility, the following formula was used from OET Bulletin 65:

$$S = \frac{33.4 (F^2) ERP}{R^2}$$

where: S = power density in $\mu W/cm^2$
 F = relative field factor at depression angle shown
 ERP = total effective radiated power in watts
 R = distance to C/R in meters

Each facility was evaluated separately with consideration given to a point 2 meters AGL located 1) at the tower base, 2) at a point 10 meters away from the tower and 3) at a point 20 meters away from the tower. For the purposes of the calculation, level ground was assumed even though actual conditions are described as ground generally sloping downward away from the tower. With this basis, the facilities tabulate as follows:

FACILITY: KUWC, 1060 Watts (530 H + 530 V)

	At tower base	At 10 M	At 20M	out from base
Depression angle	90°	75°	61°	degrees below horizon
Field from Vpat F	0.0	0.062	0.063	at depression angle
Distance from C/R R	36 m	37.4 m	41.2 m	at 2 m AGL head height
Power Density S =	0.00	0.10	0.08	$\mu W/cm^2$

Environmental Protection (continued)

FACILITY: KPTW, 0.331 kW

	At tower base	At 10 M	At 20M	out from base
Depression angle	90°	70°	54°	degrees below horizon
Field from Vpat F	0.02	0.185	0.532	at depression angle
Distance from C/R R	28 m	29.7 m	34.4 m	at 2 m AGL head height
Power Density S =	0.01	0.43	2.64	$\mu\text{W}/\text{cm}^2$

FACILITY: WITHIN PROPOSAL, 0.5 kW

	At tower base	At 10 M	At 20M	out from base
Depression angle	90°	62°	43°	degrees below horizon
Field from Vpat F	0.023	0.210	0.171	at depression angle
Distance from C/R R	18 m	20.6 m	26.9 m	at 2 m AGL head height
Power Density S =	0.03	1.74	0.68	$\mu\text{W}/\text{cm}^2$

Conclusion of nonionizing radiation study. For the purpose of determining total nonionizing radiation at the site, the sum of the power densities of the three facilities listed above was tabulated for a point 2 meters AGL as follows:

At tower base = **0.04 $\mu\text{W}/\text{cm}^2$**

At 10 meters from tower base = **2.27 $\mu\text{W}/\text{cm}^2$**

At 20 meters from tower base = **3.40 $\mu\text{W}/\text{cm}^2$**

From OET Bulletin 65, at Appendix A, the following standards for nonionizing radiation are established: At frequencies from 30 to 300 MHz, the Occupational/Controlled exposure limit is 1000 $\mu\text{W}/\text{cm}^2$ and the General Population/Uncontrolled limit is 200 $\mu\text{W}/\text{cm}^2$. As is shown by the listing and totals above, the total of all facilities at any point which could be accessed by any member of the general public, the maximum exposure is less than 2% of the General population/uncontrolled exposure limit established by OET65. Accordingly, it is represented herewith that the site represents no hazard to passers-by.

Ameliorative plan. Despite the results above, the site is located on a remote area on a non-public road. Signage is presently in place warning of potential risks to passers-by and applicant proposes to augment the signage as necessary and establish cooperative efforts with other users at the site to suspend operations or reduce power to allow work on the tower in the equipment building as is the customary practice in such situations.

Certification of preparer. I am James R. McDonald. I operate Wind River Group, Inc., an established engineering firm regularly engaged in the practice of broadcast consulting services and have prepared and filed numerous applications and exhibits before the Commission. With regard to this application, I am contracted to Dr. B. W. St. Clair. The studies and representations in this application were prepared by me or under my supervision and they are true, complete and correct to the best of my knowledge and belief.

Respectfully submitted,



James R McDonald
August 5, 2005