

SUMMARY REPORT

RADIOFREQUENCY FIELD STRENGTH SURVEY

EDUCATIONAL MEDIA FOUNDATION

January 7, 2004

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SUMMARY REPORT

RADIOFREQUENCY FIELD STRENGTH SURVEY

EDUCATIONAL MEDIA FOUNDATION

SUMMARY:

EHS-Alaska, Inc. conducted a general radiofrequency (RF) field strength survey of 2 towers located at 11259 Tower Road in Anchorage, Alaska on November 24, 2003. Mr. Paul Jewusiak, Broadcast Engineer, requested the assessment. The North Tower broadcasted three FM radio stations (88.5, 103.1 and 106.5 MHz) from 3 separate antennas. The South Tower broadcasted 2 AM radio stations (590 and 1080 kHz) and 3 FM radio stations (97.3, 102.1, and 104.1 MHz). The South Tower served as the AM antenna and the South Tower FM stations were broadcast from a single antenna. The purpose of the assessment was to determine exposure potential after the introduction of an FM radio station at the North Tower.

The Federal Communications Commission (FCC), Office of Engineering and Technology (OET) Bulletin 65, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields," was used as a reference to complete this survey. "Hot spots" as defined in OET Bulletin 65 were noted during the survey near conductive surfaces. An area diagram with sample locations and field strength results was provided as Appendix A.

Measurements associated with the North Tower were compared with the FCC's Maximum Permissible Exposure (MPE) limits in the frequency range 30 – 300 MHz for controlled and uncontrolled locations as applicable. Measurements associated with the South Tower were compared with the FCC's MPE limits in the frequency range 0.3 – 3.0 MHz for controlled and 0.3 – 1.34 for uncontrolled locations. During this survey, the field strengths from the South Tower included AM and FM emissions. In order to account for the field strength contribution solely from the South Tower's FM antenna, we recommend collecting additional measurements when the AM antenna is not in operation.

The results indicated that 2 measurements associated with the North Tower and no measurements associated with the South Tower exceeded their respective MPE guidelines. All other measurements were below the applicable MPE limits. A spreadsheet of the results and location descriptions was provided as Appendix B.

SURVEY AND MONITORING INFORMATION:

The lot, situated at 11259 Tower Road in Anchorage, Alaska, had two radio towers co-located approximately 300 feet apart. Both towers were active 100 kW towers and were transmitting during the survey at their maximum licensed operating power.

Each tower consisted of multiple emitters. When measuring fields in multiple-emitter environments, the ability of broadband survey meters to accurately measure multiple signals of varying frequencies may be limited by how the meter sums the outputs of its detectors. This may lead to significant over-estimates of the total RF field. In addition, peak rather than time averaged measurements were obtained. Such measurements represent a “worst case” and are allowable for compliance purposes.

The base of the southern tower was secured with locked fencing. Three transmitter buildings labeled A, B, and C were located along the south end of the fence line. Access was not granted and measurements were not collected in Transmitter Building B, which was not owned or controlled by the client served during this survey.

The base of the northern tower was secured with locked fencing, and a single transmitter building was enclosed within the fencing.

Fenced locations and locations within locked transmitter buildings were considered controlled because access was limited to only authorized personnel. Locations outside of the fenced towers and outside of the secured transmitter buildings were considered uncontrolled because the general public could gain access to these areas. It should be noted that radiofrequency hazard warning signs were posted adequately around these areas.

Measurements in the electric (E) and magnetic (H) fields were taken using a Holaday Isotropic Broadband Field Strength Meter. The instrument was used to determine exposures by slowly moving the probe while scanning over an area approximately equivalent to the projected area of a human body. A maximum field reading was obtained at each location by recording the peak reading obtained from the instrument’s “peak hold” feature. All field strength measurements were made at distances of at least 20 centimeters from any conductive object.

The analog meter displays field measurements in field strength units squared. When using the E field probe the units are V^2/m^2 and when using the H field probe the units are A^2/m^2 . In order to compare field measurements with the FCC’s MPE limits, the square roots of the field measurements were calculated. Model, serial numbers and certificate of calibration conformance were provided as Appendix C.

MAXIMUM PERMISSIBLE EXPOSURE (MPE) LIMITS:

OET Bulletin 65 publishes MPE limits for both occupational exposure to electromagnetic fields and general population exposure. The occupational exposure limits apply to situations where the potentially exposed person would be occupationally exposed and are fully aware of their potential exposure. Such persons, because of their knowledge, can exercise control over their exposures. The MPE limits for the general population apply to situations where the potentially exposed person may not be fully aware of the potential for exposure and cannot exercise control over their exposure.

The FCC's MPE limits are frequency dependant and have a time averaging provision. For exposure monitoring, which was not within the proposed scope of work for this study, controlled location MPE limits are averaged over 6 minutes and uncontrolled location MPE limits are averaged over 30 minutes. The MPE limits applicable to this study are summarized in the following table.

MPE Limits for Occupational and General Population RF Exposure

Maximum Permissible Exposure (MPE) Limit at 0.3 – 1.34 MHz (AM Frequencies) for General Population/Uncontrolled Exposure (30 minute averaging time)	
Electric Field Strength (E) (Volts/Meter)	Magnetic Field Strength (H) (Amperes/Meter)
614	1.63
Maximum Permissible Exposure (MPE) Limit at 0.3 – 3.0 MHz (AM Frequencies) for Occupational/Controlled Exposure (6 minute averaging time)	
Electric Field Strength (E) (Volts/Meter)	Magnetic Field Strength (H) (Amperes/Meter)
614	1.63
Maximum Permissible Exposure (MPE) Limit at 30 - 300 MHz (FM Frequencies) for General Population/Uncontrolled Exposure (30 minute averaging time)	
Electric Field Strength (E) (Volts/Meter)	Magnetic Field Strength (H) (Amperes/Meter)
27.5	0.073
Maximum Permissible Exposure (MPE) Limit at 30 - 300 MHz (FM Frequencies) for Occupational/Controlled Exposure (6 minute averaging time)	
Electric Field Strength (E) (Volts/Meter)	Magnetic Field Strength (H) (Amperes/Meter)
61.4	0.163

MONITORING RESULTS & DISCUSSION:

As shown in the results spreadsheet found in Appendix B of this report, the November 24, 2003 RF field strength peak measurement results indicated that 2 measurements associated with the North Tower and no measurements associated with the South Tower exceeded the applicable MPE guidelines.

One of the two measurements that exceeded the MPE limit was at the south guy wire of the North Tower. This measurement was collected at an uncontrolled location that was in closer proximity to the South Tower than to the North Tower and was most likely indicative of the South Tower's AM frequency emissions. The other North Tower measurement that exceeded the MPE limit was at a controlled location within the fenced area at the base of the North Tower near the transmission cables. This location was considered a "hot spot". Employees should be made aware of and should avoid spending extended periods of time at this location so that they can exercise control over their potential exposure.

As was mentioned earlier, the measurements collected at the South Tower locations were compared with the FCC's MPE limits in the frequency range 0.3 – 3.0 MHz for controlled and 0.3 – 1.34 for uncontrolled locations. In order to account for the field strength contribution from the South Tower's FM antenna, we recommend collecting additional measurements when the AM antenna is not in operation. In addition, past monitoring data, if any exists, at the South Tower may be useful in characterizing the South Tower's FM field strength contribution.

CONCLUSIONS:

The RF field strength measurements from the November 24, 2003 monitoring indicated the potential for exposure above the applicable 30 – 300 MHz MPE limits at 2 locations associated with the North Tower.

One location that exceeded the MPE limits was at a controlled area near a “hot spot” at the base of the North Tower.

The other location that exceeded the MPE limits was at an uncontrolled area near the South Tower. We suspect that this location was indicative of the South Tower's AM contribution rather than the North Tower's FM contribution.

The RF field strength measurements from the November 24, 2003 monitoring indicated that no measurements associated with the South Tower exceeded their respective 0.3 – 3.0 and 0.3 – 1.34 MPE limits at either controlled or uncontrolled locations.

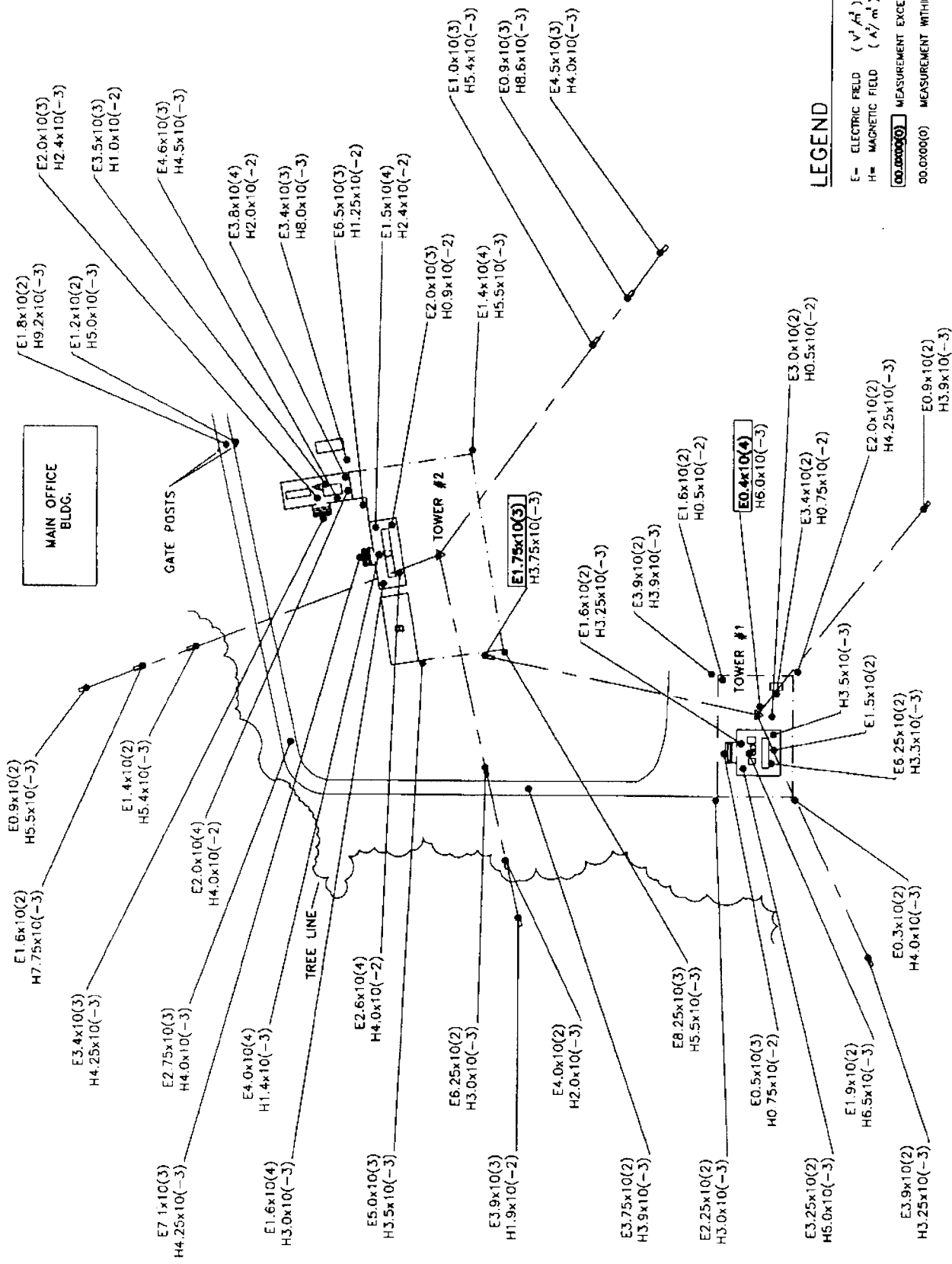
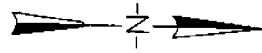
RECOMMENDATIONS:

EHS-Alaska recommends the following:

1. In order to account for the field strength contribution from the South Tower's FM antenna, we recommend collecting additional measurements when the AM antenna is not in operation. In addition, past monitoring data, if any exists, at the South Tower may be useful in characterizing the South Tower's FM field strength contribution.
2. Areas above the FCC's MPE limits should be marked with appropriate warning signs and fenced in such a way as to restrict public access.
3. Employees working at the tower locations should be advised of the active transmitters and they should follow the instructions of all warning signs.
4. Conductive objects such as guy wires, anchor points, fencing, and metal buildings are potential “hot spots.” Employees should be made aware of and should avoid spending extended periods of time at potential “hot spot” locations so that they can exercise control over their potential exposure.

APPENDIX A

SAMPLE LOCATIONS DRAWING



E. M. FOUNDATION BROADCASTING
ANCHORAGE, AK
RADIO FREQUENCY SURVEY

NOVEMBER 24, 2003
RF SURVEY SAMPLING
LOCATIONS AND RESULTS

EHS ALASKA
INCORPORATED
ENGINEERING, HEALTH & SAFETY CONSULTANTS
10000 Eagle River Road, Suite 200, Eagle River, AK 99577-0008

DATE: 11/24/03
DWG. NO: 1 of 1

APPENDIX B

RESULTS SPREADSHEET

RF Survey Measurements						
11259 Tower Road						
November 24, 2003						
North Tower #1 (88.5 / 103.1 / 106.5)						
Location	E Field (V²/m²)	H Field (A²/m²)	E Field (V/m)	H Field (A/m)	S_E (mW/cm²)	S_H (mW/cm²)
30-300 MHz - FCC MPE Occupational/Controlled			61.400	0.163	1.0	1.0
Base of Steps at Trans. Shack Entrance	500.0	0.00750	22.361	0.087	0.133	0.283
SE corner, inside Trans. Shack	325.0	0.00500	18.028	0.071	0.086	0.189
N. middle, beneath cable line, Trans. Shack	625.0	0.00330	25.000	0.057	0.166	0.124
NW corner, inside Trans. Shack	150.0	0.00350	12.247	0.059	0.040	0.132
Middle room, Trans. Shack	190.0	0.00650	13.784	0.081	0.050	0.245
SW corner, inside Trans. Shack	160.0	0.00325	12.649	0.057	0.042	0.123
SW corner of tower base at cables	4000.0	0.00600	63.246	0.077	1.061	0.226
North of tower base within 6 ft.	300.0	0.00500	17.321	0.071	0.080	0.189
East middle, outside Cell Trans. Unit.	340.0	0.00750	18.439	0.087	0.090	0.283
SW corner inside North Tower fencing	160.0	0.00500	12.649	0.071	0.042	0.189
30-300 MHz - FCC MPE General Population/Uncontrolled			27.500	0.073	0.2	0.2
SE corner outside North Tower Fencing	225.0	0.00300	15.000	0.055	0.060	0.113
SW corner outside North Tower Fencing	390.0	0.00390	19.748	0.062	0.103	0.147
NW corner outside North Tower Fencing	200.0	0.00425	14.142	0.065	0.053	0.160
NE corner outside North Tower Fencing	30.0	0.00400	5.477	0.063	0.008	0.151
NW guy wire anchor, North Tower	90.0	0.00390	9.487	0.062	0.024	0.147
NE guy wire anchor, North Tower	390.0	0.00325	19.748	0.057	0.103	0.123
South guy wire anchor, North Tower	1750.0	0.00375	41.833	0.061	0.464	0.141

South Tower #2 (590 / 1080 / AM) (104.1 / 102.1 / 97.3 FM)						
Location	E Field (V²/m²)	H Field (A²/m²)	E Field (V/m)	H Field (A/m)	S_E (mW/cm²)	S_H (mW/cm²)
0.3 - 3.0 MHz - FCC MPE Occupational/Controlled			614.000	1.630	100	100
East door inside Trans. Shack A beneath cables	2000.0	0.00240	44.721	0.049	0.5	0.1
NE inside Trans. Shack A beneath cables	4600.0	0.00450	67.823	0.067	1.2	0.2
NE corner inside Trans. Shack A	20000.0	0.04000	141.421	0.200	5.3	1.5
NW corner inside Trans. Shack A	38000.0	0.02000	194.936	0.141	10.1	0.8
NW middle Trans. Shack A beneath cables	3500.0	0.01000	59.161	0.100	0.9	0.4
Inside entry, Trans. Shack C	40000.0	0.00140	200.000	0.037	10.6	0.1
SE corner inside Trans. Shack C	16000.0	0.00300	126.491	0.055	4.2	0.1
NE corner inside Trans. Shack C	26000.0	0.04000	161.245	0.200	6.9	1.5
NW corner inside Trans. Shack C	2000.0	0.00900	44.721	0.095	0.5	0.3
SW corner inside Trans. Shack C	15000.0	0.02400	122.474	0.155	4.0	0.9
0.3 - 1.34 MHz - FCC MPE General Population/Uncontrolled			614.000	1.630	100	100
Outside Trans. Shack A at bottom of steps	3400.0	0.00425	58.310	0.065	0.9	0.2
Outside Trans. Shack C at bottom of steps	7100.0	0.00425	84.261	0.065	1.9	0.2
Between Trans. Shacks A & C, outside fence	6500.0	0.01250	80.623	0.112	1.7	0.5
NW anchor #1, from South Tower	1000.0	0.00540	31.623	0.073	0.3	0.2
NW anchor #2, from South Tower	900.0	0.00860	30.000	0.093	0.2	0.3
NW anchor #3, from South Tower	4500.0	0.00400	67.082	0.063	1.2	0.2
NE anchor #1, from South Tower	625.0	0.00300	25.000	0.055	0.2	0.1
NE anchor #2, from South Tower	400.0	0.00200	20.000	0.045	0.1	0.1
NE anchor #3, from South Tower	3900.0	0.01900	62.450	0.138	1.0	0.7
South anchor #1, from South Tower	140.0	0.00540	11.832	0.073	0.0	0.2
South anchor #2, from South Tower	160.0	0.00775	12.649	0.088	0.0	0.3
South anchor #3, from South Tower	90.0	0.00550	9.487	0.074	0.0	0.2
SE corner outside fence by Trans. Shack B	5000.0	0.00350	70.711	0.059	1.3	0.1
NE corner outside fence, South Tower	8250.0	0.00550	90.830	0.074	2.2	0.2
NW corner outside fence, South Tower	14000.0	0.00550	118.322	0.074	3.7	0.2
NW corner outside Trans. Shack A	3400.0	0.00800	58.310	0.089	0.9	0.3
1/3rd distance from gate to N. Tower	2750.0	0.00400	52.440	0.063	0.7	0.2
2/3rd distance from gate to N. Tower	375.0	0.00390	19.365	0.062	0.1	0.1
Left (North) gate pole outside tower site entrance	120.0	0.00500	10.954	0.071	0.0	0.2
Between gate poles outside tower site entrance	180.0	0.00920	13.416	0.096	0.0	0.3

APPENDIX C

CALIBRATION CERTIFICATE

Certificate of Calibration Conformance

Page 1 of 1

The instrument listed below has been individually calibrated in compliance with the following standard(s):
IEEE 1309-1996, Institute of Electrical and Electronics Engineers, Standard for Calibration of Electromagnetic Field Sensors and Probes,
Excluding Antennas from 9 kHz to 40 GHz.

Environment: Laboratory MTE is maintained in a temperature controlled environment with ambient conditions from 18 to 28 degrees C, relative humidity less than 90%. The instrument under test has been calibrated in an environment which is conducive to accurate and reliable measurements.

Manufacturer:	Holaday	Operating Range:	E Field .5 MHz - 5 GHz H Field 5 MHz - 300MHz RF Survey Meter
Model Number:	HI-3012	Instrument Type:	
Serial Number:	87649	Alternate ID:	
Tracking #:	S000202	Customer:	Ashtead Technology Rental (NY)
Date Completed:	21-Oct-03	Condition of Instrument:	
Test Type:	Standard Field	Upon Receipt	Upon Release
Calibration Uncertainty:	+/- 2dB (95% Confidence Level)	In Tolerance	In Tolerance

CALIBRATION CORRECTION FACTORS

Range	MSE Probe		HCH Probe		Probe		Probe	
	S/N	267E	S/N	279H				
	Pre-Cal	Post-Cal	Pre-Cal	Post-Cal	Pre-Cal	Post-Cal	Pre-Cal	Post-Cal
X10 ²	1.00	1.00	X	X				
X10 ³	1.00	1.00	X	X				
X10 ⁴	1.00	1.00	X	X				
X10 ⁵	1.00	1.00	X	X				
X.001	X	X	1.00	1.00				
X.01	X	X	1.00	1.00				
X.1	X	X	1.00	1.00				
X1	X	X	1.00	1.00				

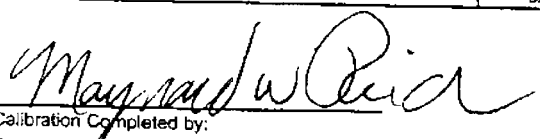
Calibration Frequency: 27 MHz

Correction factors are for meter indication in V²/m². Recorder output is in power.

Comments:

Calibration Traceability: All Measuring and Test Equipment (MTE) identified below are traceable to the National Institute for Standards and Technology (NIST).
Calibration Laboratory and Quality System are compliant with ISO/IEC 17025-1999.

Instrument	Model	S/N	Cal Date	Due Date
HP Power Meter	437B	3125u17245	6 Aug 03	6 Aug 04
HP Power Sensor	8482H	1925A03877	16 Apr 03	16 Apr 04
Boonton RF Millivolt Meter	9200A	908108A	22 May 03	22 May 04


Calibration Completed by:
Calibration Technician:


Attested and Issued on: 21-Oct-03
Calibration Supervisor:

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