# ENGINEERING EXHIBIT

## Incentive Auction Channel Reassignment

## Application for License to Cover Construction Permit
## Digital Television Station

prepared for

**WGBH Educational Foundation**
WGBX-TV Boston, MA
Facility ID 72098
Ch. 32 922 kW 388 m

*WGBH Educational Foundation ("WEF")* is the licensee of digital television station WGBX-TV, Facility ID 72098, Boston, MA. Reassignment of WGBX-TV from Channel 43 to Channel 32 was specified in the *Incentive Auction Closing and Channel Reassignment Public Notice* (*"CCRPN"*, DA 17-317, released April 13, 2017). A Construction Permit ("CP" file# 0000073038) authorizes WGBX-TV to operate on Channel 32 at 922 kW effective radiated power ("ERP") with a nondirectional antenna at 388 meters height above average terrain ("HAAT"). WGBX-TV successfully transitioned to Channel 32 at phase 4 (required completion date of August 2, 2019) utilizing an auxiliary antenna located at a different site at 922 kW ERP and 350 meters HAAT (file# 0000080347).

The WGBX-TV reassignment main facility has been constructed and *WEF* herein seeks a license to cover the CP. The WGBX-TV facility has been constructed pursuant to the parameters specified in the CP, except that the nondirectional antenna utilizes elliptical polarization in lieu of the circular polarization specified in the CP, and a substitute nondirectional antenna make and model was utilized. The antenna, which is shared with several other television stations, is a nondirectional RFS model PEP70E-O5-2-T. The alternate nondirectional antenna make and model information is specified in the license application, as a nondirectional antenna make/model substitution is permitted by §73.1690(c)(1) on a license application.

The change from circular polarization to elliptical polarization merely represents a decrease in vertically polarized ERP. Historically, a change in vertically polarized ERP is permitted by §73.1690(c)(4) to be specified on a license application. However, electronic filing currently

provided by the FCC's Licensing and Management System does not provide opportunity for the applicant to change the type of polarization.

*WEF* requests that the license record specify elliptical polarization rather than circular polarization as authorized in the CP. The ERP, antenna location, and antenna height as constructed match the values authorized in the CP. A summary of the technical values which differ from those authorized in the CP is provided below.

| | CP File# 0000073038 | As-Built Values for License |
|---|---|---|
| Antenna Make | Dielectric | RFS |
| Antenna Model | TUM-AP-O4-14/56H-2-T | PEP70E-O5-2-T |
| Polarization | Circular | Elliptical |

The shared antenna employs 50 percent vertical polarization for WGBX-TV, where the horizontally polarized nondirectional ERP is 922 kW and the vertically polarized nondirectional ERP is 462 kW. [1] The vertically polarized component does not exceed the horizontally polarized component at any azimuth.

**Human Exposure to Radiofrequency Electromagnetic Field**

The WGBX-TV operation was evaluated for human exposure to RF energy using the procedures outlined in the FCC's OET Bulletin Number 65. Based on OET-65 equation (10), and considering 10 percent antenna relative field in downward elevations (pattern data shows less than 10 percent relative field at angles 10 to 90 degrees below the antenna), the calculated signal density near the tower at two meters above ground level attributable to the WGBX-TV facility is 3.1 $\mu W/cm^2$, which is 0.8 percent of the general population/uncontrolled maximum permitted exposure limit. This is below the five percent threshold limit described in §1.1307(b) regarding sites with multiple emitters, categorically excluding the applicant from responsibility for taking any corrective action in the areas where the proposal's contribution is less than five percent.

[1]The antenna provides for adjustable vertical polarization. The antenna provides separate inputs for horizontally polarized and vertically polarized radiators, which permits each of the television stations that share the antenna to individually choose how much vertical polarization to utilize.

The general public will not be exposed to RF levels attributable to the proposal in excess of the FCC's guidelines. RF exposure warning signs will continue to be posted. With respect to worker safety, the applicant will coordinate exposure procedures with all pertinent stations and will reduce power or cease operation as necessary to protect persons having access to the site, tower, or antenna from RF electromagnetic field exposure in excess of FCC guidelines.

**Chesapeake RF Consultants, LLC**
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