# TVA

January 16, 2009

TVA-BFN-TS-418                                                    10 CFR 50.90
TVA-BFN-TS-431

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Mail Stop OWFN, P1-35
Washington, D. C. 20555-0001

In the Matter of                        )              Docket Nos. 50-259
Tennessee Valley Authority              )                          50-260
                                                                   50-296

**BROWNS FERRY NUCLEAR PLANT (BFN) – UNITS 1, 2, AND 3 – TECHNICAL
SPECIFICATIONS (TS) CHANGES TS-418 AND TS-431 – EXTENDED POWER
UPRATE (EPU) – RESPONSE TO ROUND 23 REQUEST FOR ADDITIONAL
INFORMATION (RAI) REGARDING STEAM DRYER SIGNAL PROCESSING
(TAC NOS. MD5262, MD5263, AND MD5264)**

By letters dated June 28, 2004 and June 25, 2004 (ADAMS Accession Nos.
ML041840109 and ML041840301), TVA submitted license amendment applications to
NRC for the EPU of BFN Unit 1 and BFN Units 2 and 3, respectively. The proposed
amendments would change the operating licenses to increase the maximum authorized
core thermal power level of each reactor by approximately 14 percent to 3952 megawatts.

Enclosure 1 provides the responses for three draft Round 23 RAIs regarding signal
processing associated with the steam dryer analyses for EPU (EMCB.202/163,
EMCB.203/164 - Unit 1 plots, and EMCB.165). The responses to three draft Round 23
RAIs associated with submodeling (EMCB.201/162, EMCB.166, and EMCB.167) were
provided by letter dated January 9, 2009. The response to RAI EMCB.203/164 (Unit 2
plots) is scheduled to be submitted by January 23, 2009. The schedule for providing the
response to the remaining draft Round 23 RAI (EMCB.204/168) is being developed and
will be discussed with the NRC staff.

Note that Enclosure 1 contains information that Continuum Dynamics, Inc. (CDI) considers
to be proprietary in nature and subsequently, pursuant to 10 CFR 2.390(a)(4), CDI
requests that such information be withheld from public disclosure. Enclosure 3 provides
an affidavit from CDI supporting this request. Enclosure 2 contains the redacted version
of the proprietary enclosure with the CDI proprietary material removed, which is suitable
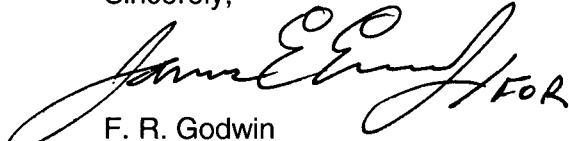for public disclosure.

U.S. Nuclear Regulatory Commission
Page 2
January 16, 2009


TVA has determined that the additional information provided by this letter does not affect the no significant hazards considerations associated with the proposed TS changes. The proposed TS changes still qualify for a categorical exclusion from environmental review pursuant to the provisions of 10 CFR 51.22(c)(9).

No new regulatory commitments are made in this submittal. If you have any questions regarding this letter, please contact me at (256)729-2636.

I declare under penalty of perjury that the foregoing is true and correct. Executed on this 16th day of January, 2009.

Sincerely,

F. R. Godwin
Manager of Licensing
 and Industry Affairs

Enclosures:

1. Response to Round 23 Request for Additional Information (RAI) Regarding Steam Dryer Signal Processing (Proprietary Version)

2. Response to Round 23 Request for Additional Information (RAI) Regarding Steam Dryer Signal Processing (Non-proprietary Version)

3. CDI Affidavit

U.S. Nuclear Regulatory Commission
Page 3
January 16, 2009

Enclosures
cc (Enclosures):
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     Alabama State Department of Public Health
     RSA Tower - Administration
     Suite 1552
     P.O. Box 303017
     Montgomery, Alabama 36130-3017

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     Eugene F. Guthrie, Branch Chief
     U.S. Nuclear Regulatory Commission
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     Sam Nunn Atlanta Federal Center
     61 Forsyth Street, SW, Suite 23T85
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     NRC Resident Inspector
     Browns Ferry Nuclear Plant
     10833 Shaw Road
     Athens, Alabama 35611-6970

**ENCLOSURE 2**

**TENNESSEE VALLEY AUTHORITY**
**BROWNS FERRY NUCLEAR PLANT (BFN)**
**UNITS 1, 2, AND 3**

**TECHNICAL SPECIFICATIONS (TS) CHANGES TS-431 AND TS-418**
**EXTENDED POWER UPRATE (EPU)**

**RESPONSE TO ROUND 23 REQUEST FOR ADDITIONAL INFORMATION (RAI)**
**REGARDING STEAM DRYER SIGNAL PROCESSING**

**(NON-PROPRIETARY VERSION)**

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Attached is the non-proprietary version of the Response to Round 23 RAI Regarding Steam Dryer Signal Processing.

## NRC RAI EMCB.202/163 (Units 1 and 2)

In the response to EMCB 200./157., TVA states that the coherence between the upper and lower strain gage arrays is modified by removing EIC signals from the individual strain gage autospectra (step 1). Then, notch filters are applied to remove tones from the signals which are unrelated to dryer loads (step 2). In step 3, the coherence between the modified upper and lower strain gage array signals is computed. The coherence between two spectra is:

$\gamma^2 = |G_{12}|^2/(G_{11}{}^*G_{22})$,

where G12 is the cross-spectrum between the two signals, and G11 and G22 are the autospectra of the individual signals. Explain how G12 is modified after using EIC signals and notch filters prior to being used in the coherence calculation. This explanation should include how both the magnitude and phase of G12 are modified.

## TVA Response to EMCB.202/163 (Units 1 and 2)

The cross spectra $G_{12}$ is never directly calculated but is one of three factors in the computation of the coherence. The coherence is $\gamma^2$

$$\gamma^2 = \frac{|G_{12}|^2}{G_{11}*G_{22}}$$

where     $G_{11}$ is the auto spectra at location 1
                 $G_{22}$ is the auto spectra at location 2
                 $G_{12}$ is the cross spectrum between locations 1 and 2

and the coherence is only used to condition the current licensed thermal power (CLTP) and low flow (LF) main steam line (MSL) strain gage pressure signals immediately prior to the subtraction (scaling) of the CLTP data by the LF data. To see first that there is little change to the cross spectra at CLTP conditions as result of signal conditioning, we have plotted the coherence between the upper and lower strain gage data from each steam line at CLTP conditions from the raw data and after notch filtering in Figures EMCB.202/163-5a and 5b. In general, the coherence is very similar except at discrete frequencies which have been notch filtered as expected.

To see how the magnitude and phase of $G_{12}$ are modified, see Figures EMCB.202/163-1a through 1d where the CLTP and corresponding electrical interference check (EIC) cross spectra magnitude and CLTP cross spectra phase between upper and lower raw data from the steam lines are shown. The phase of the EIC cross spectra is not shown as it is randomly distributed in frequency.

Figures EMCB.202/163-2a through 2b provide the above mentioned spectra on low power, designated LF. It is clear that the cross spectrum magnitude indicates no correlation except at 60, 120, 180 and 240 Hertz (Hz).

In Figures EMCB.202/163-3a through 3d the cross spectra magnitude and phase after EIC subtraction (scaling) for CLTP and LF data are shown.

In Figures EMCB.202/163-4a through 4d, the cross spectra magnitude and phase are shown after notch filtering for the CLTP and LF data. One could compare the cross spectra before and after notch filtering by comparing Figures EMCB.202/163-3 and 4. At this point, the coherence

would seem more relevant as it is used to condition the CLTP and LF data sets. Examine Figures EMCB.202/163-5 and 6 for coherence discussed above to determine that there has been little change in the cross spectrum when normalized by the auto spectra from CLTP and LF, respectively, except at discrete frequencies as expected.
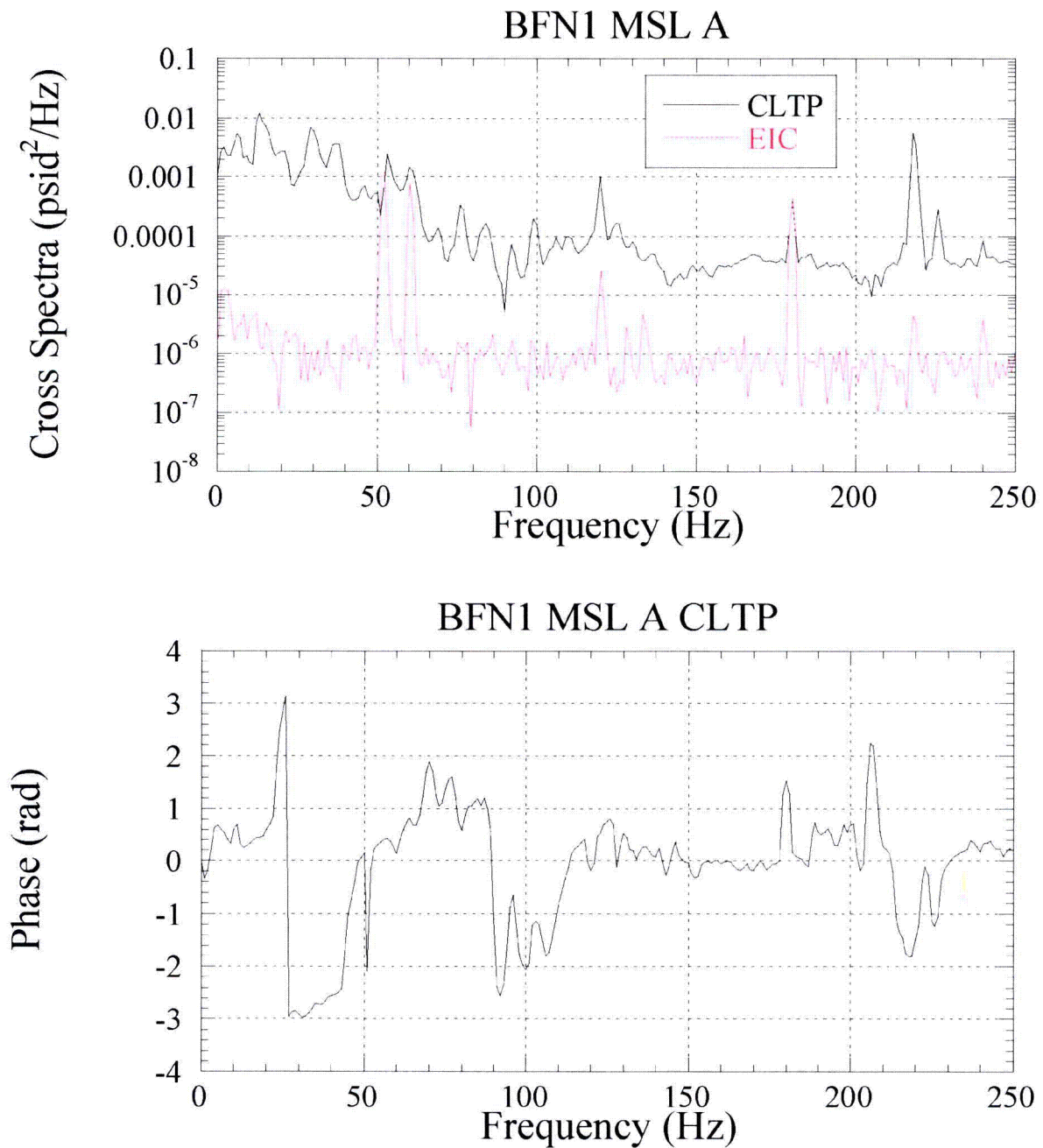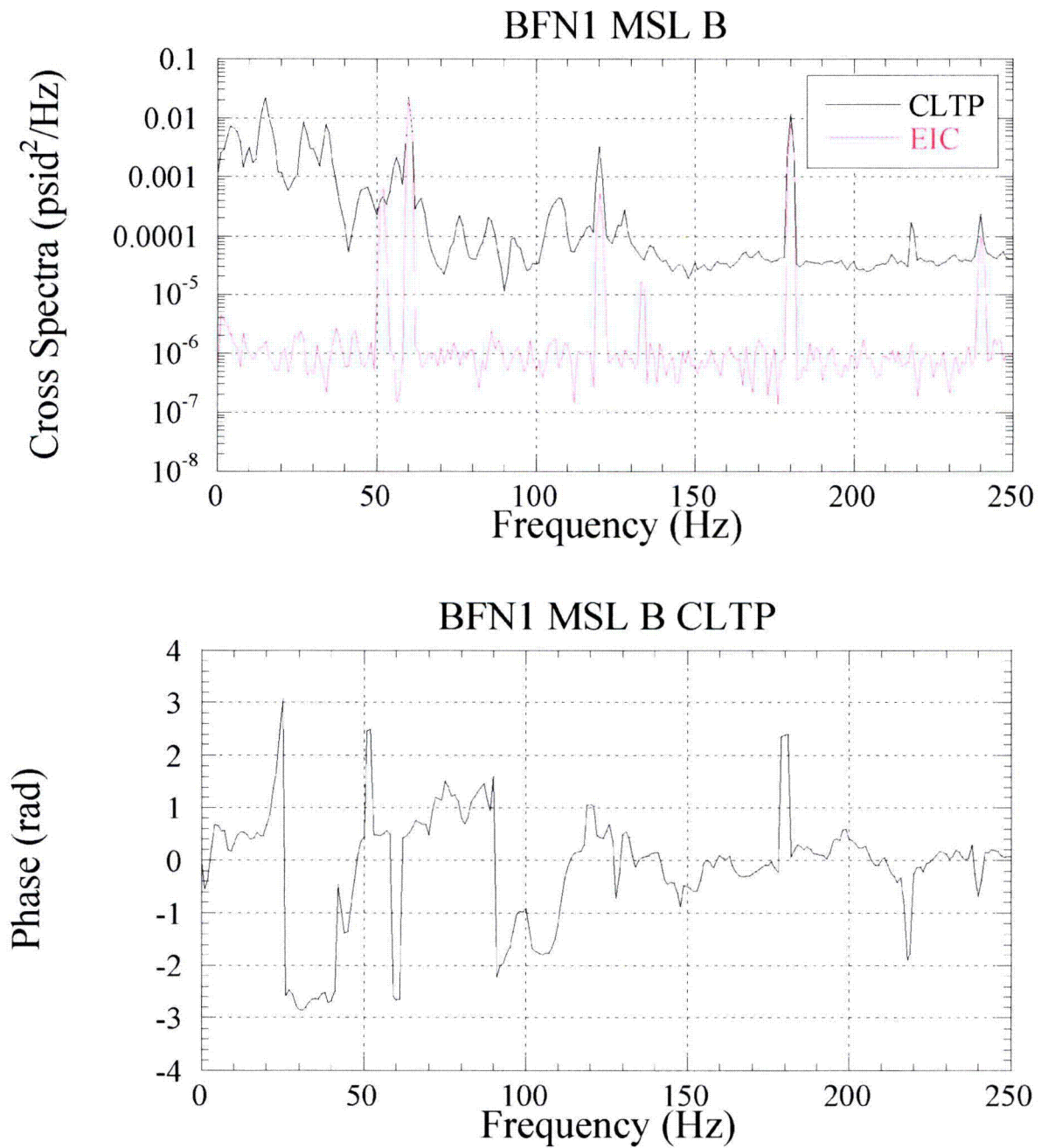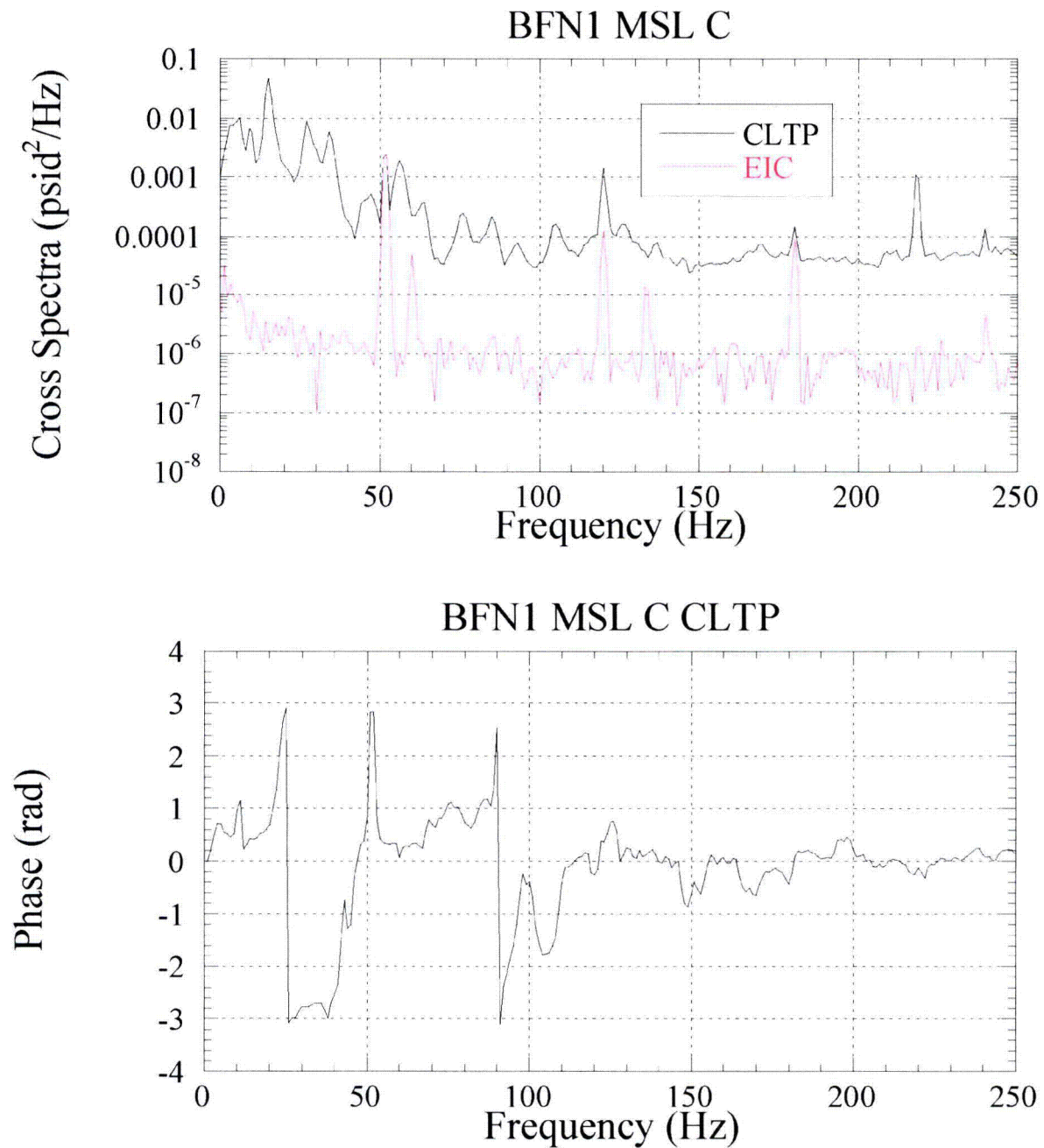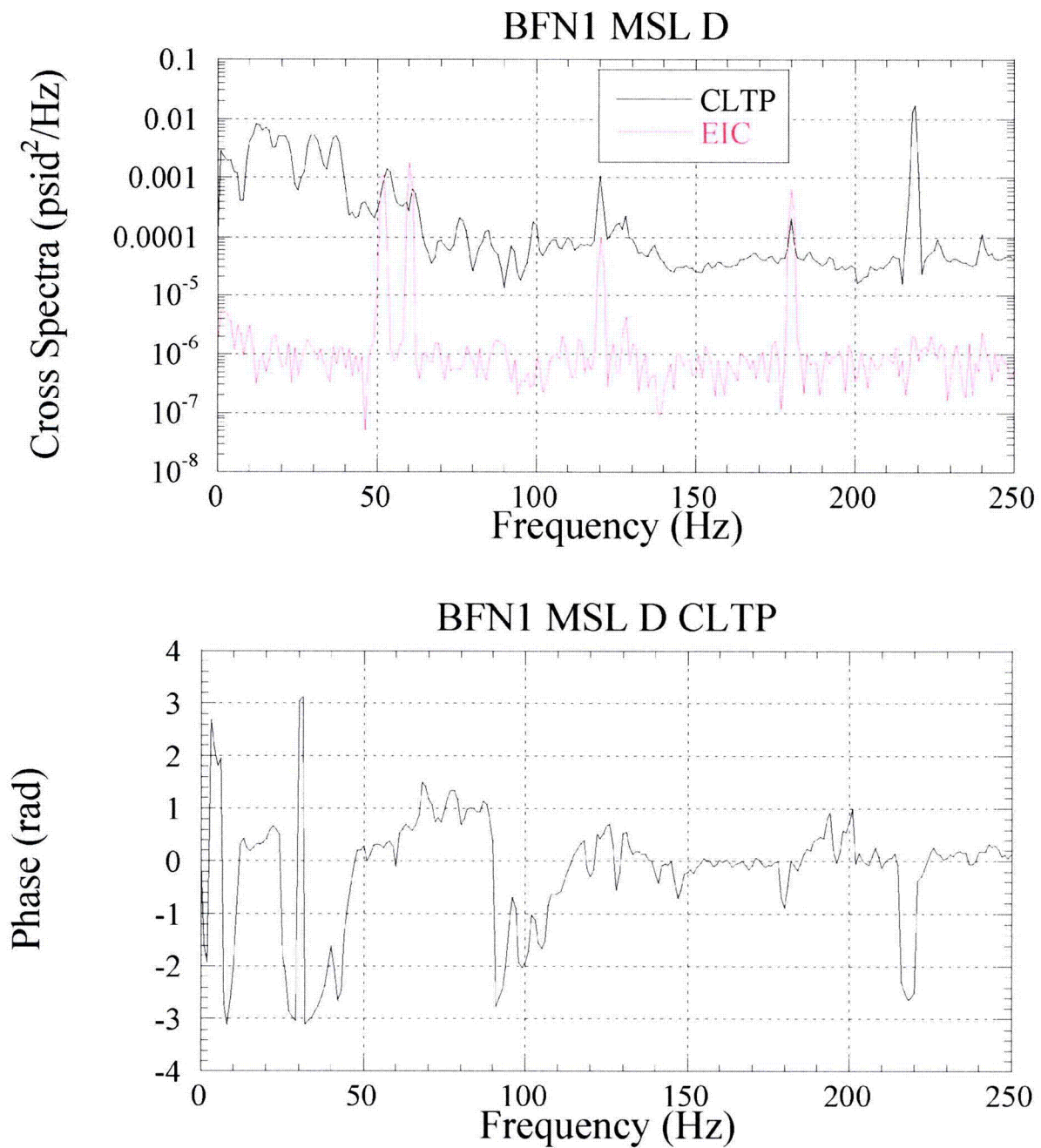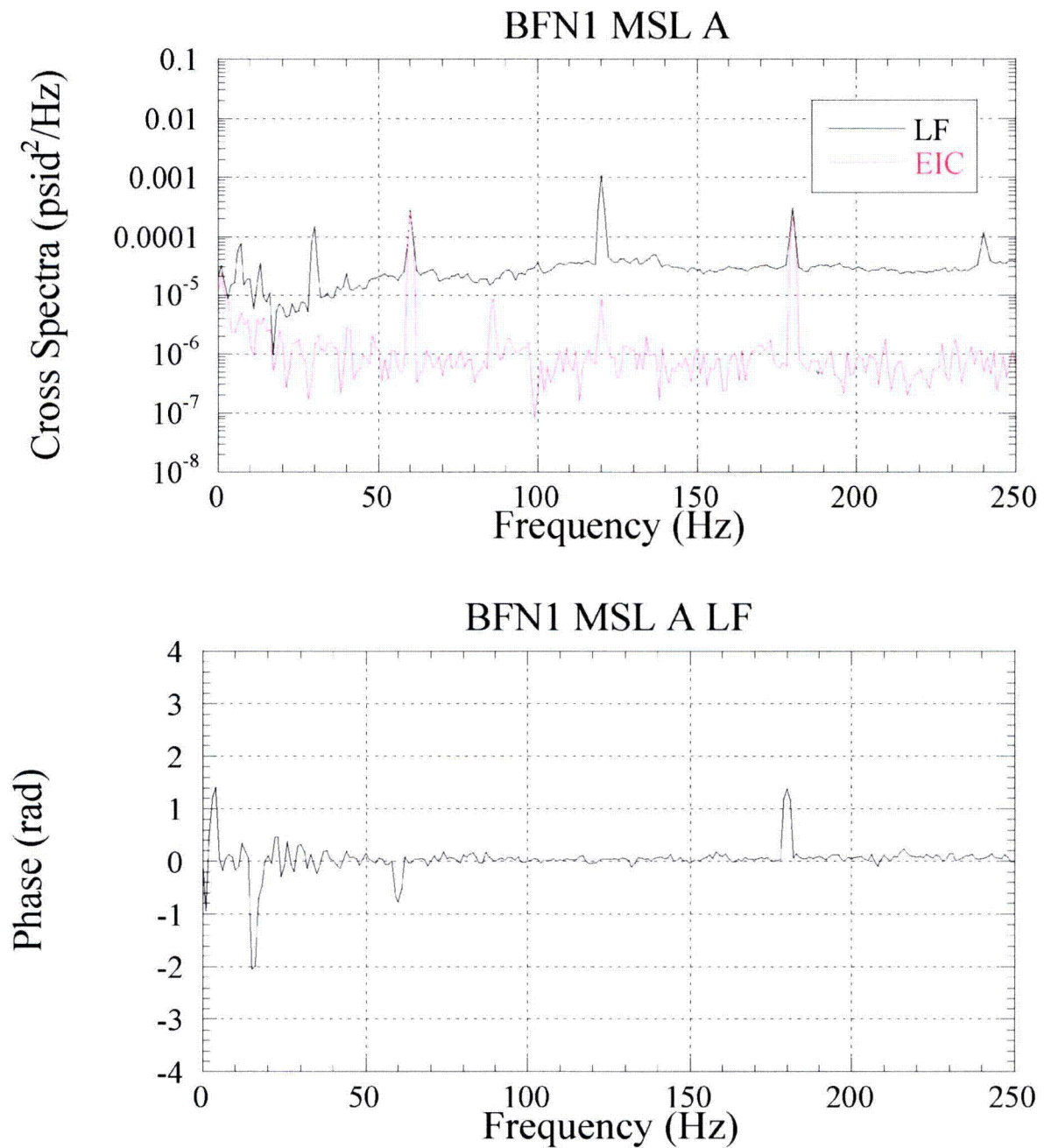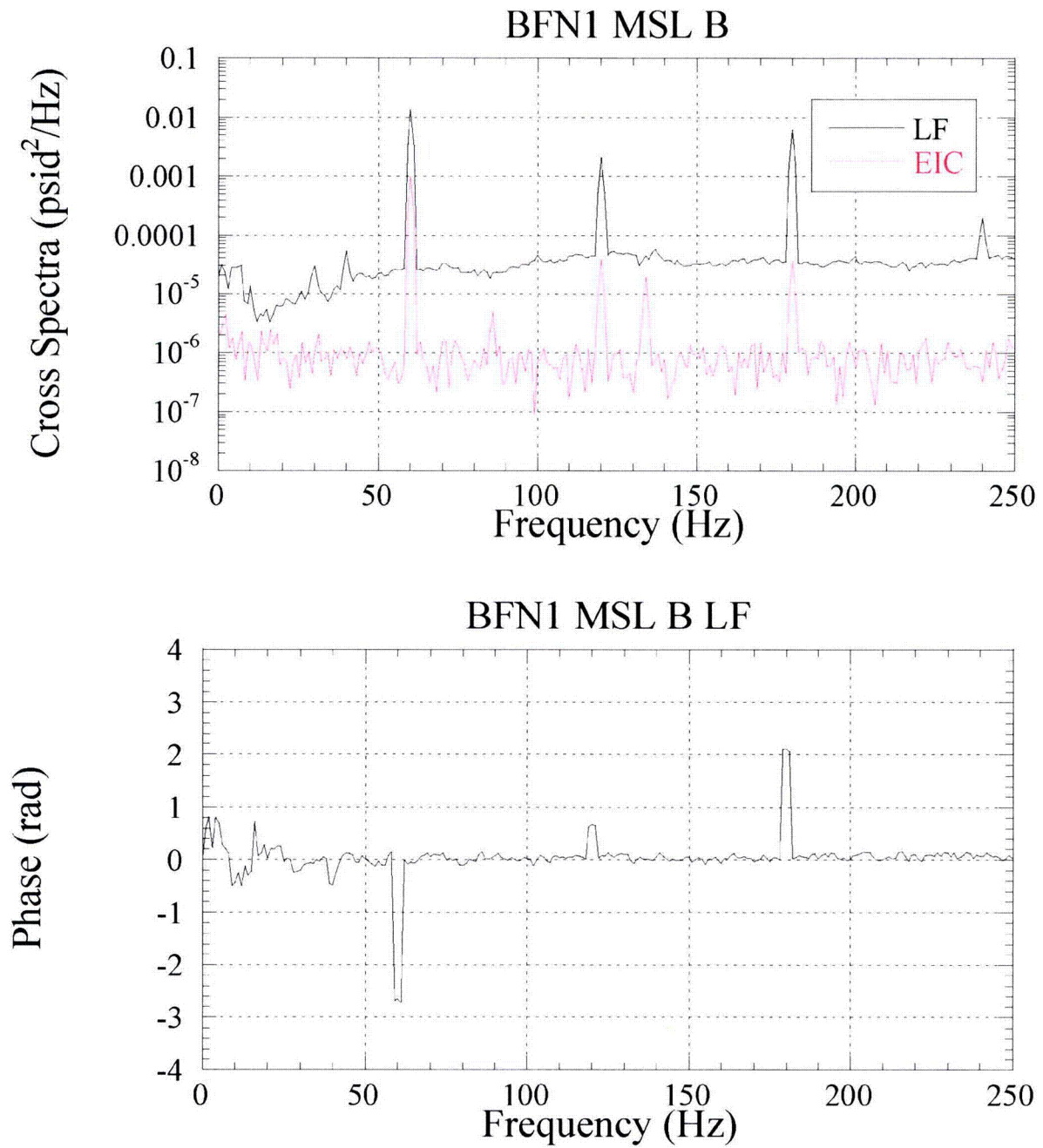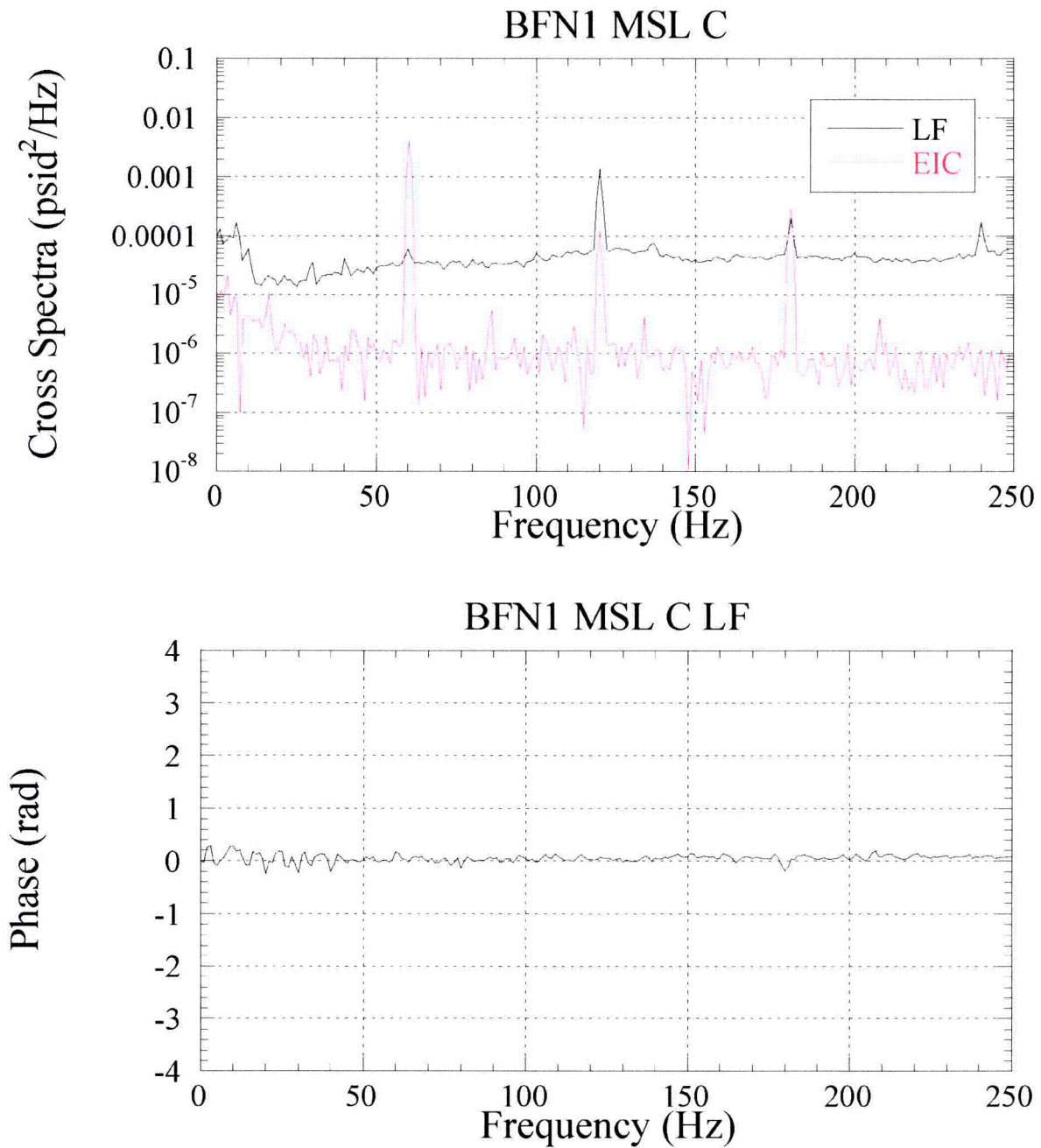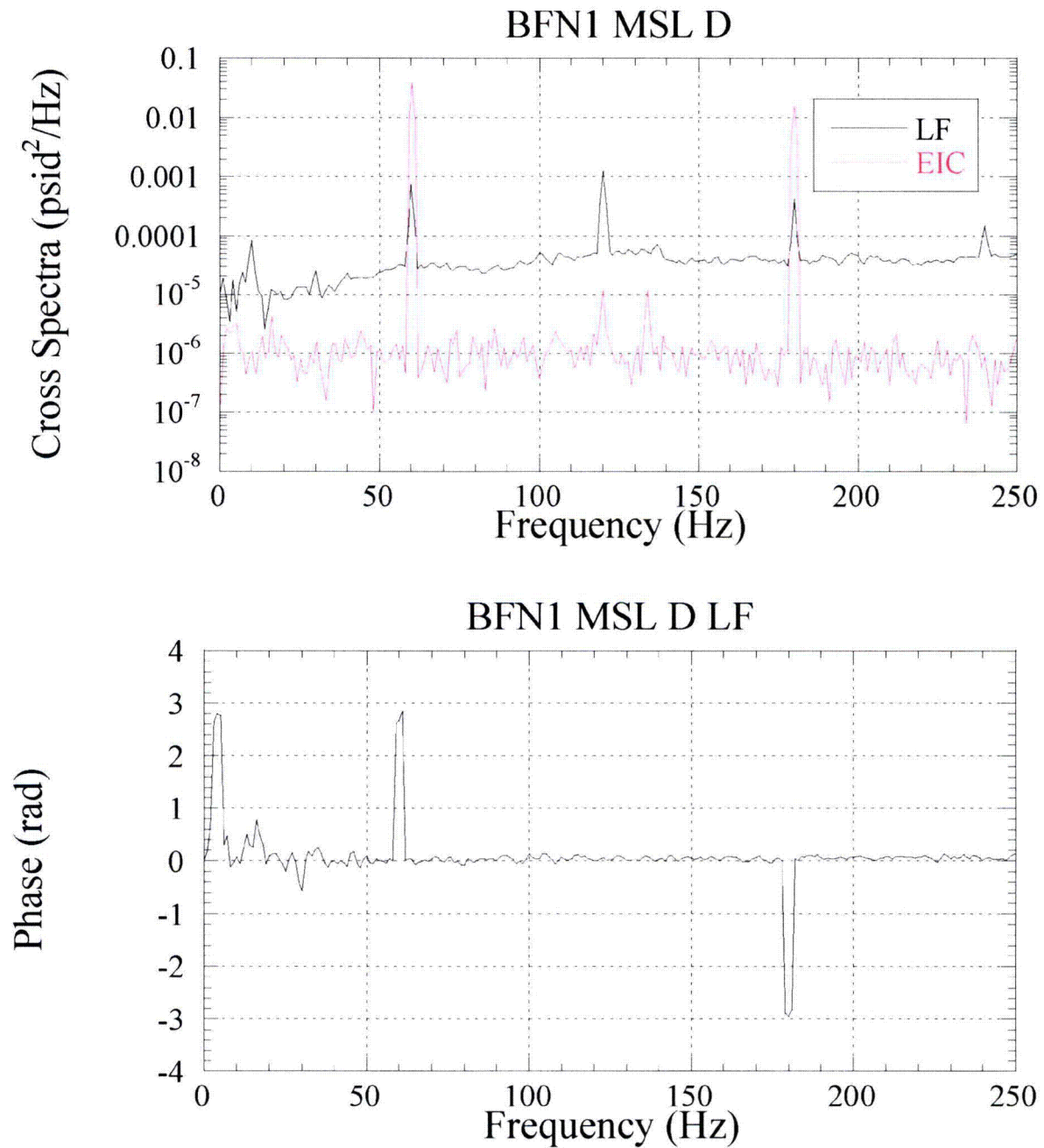
Figure EMCB.202/163-1a. Cross Spectra for BFN1 main steam line A: magnitude (top) and phase (bottom) for CLTP conditions (black) and corresponding EIC magnitude (red).
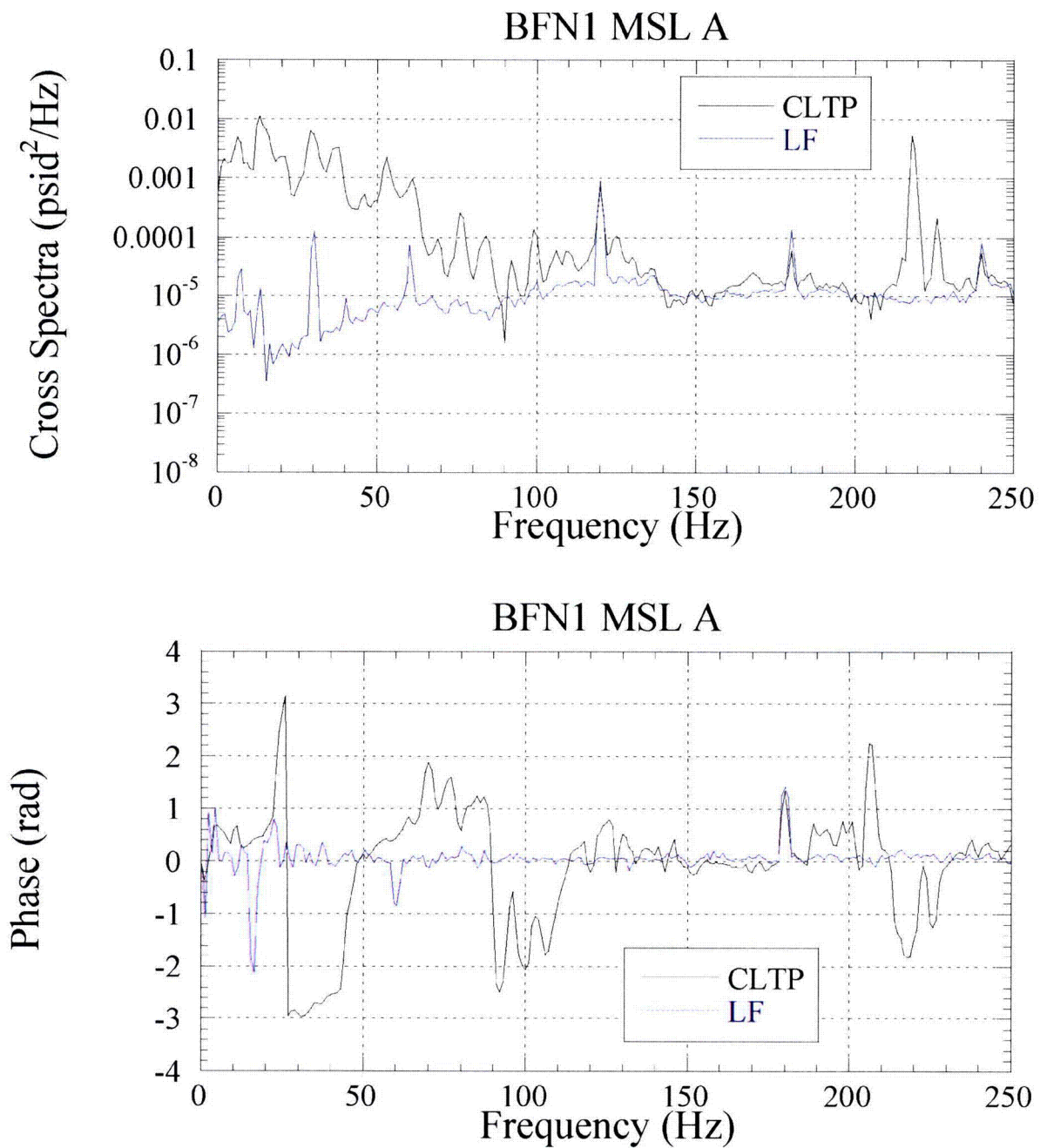
## BFN1 MSL B



## BFN1 MSL B CLTP
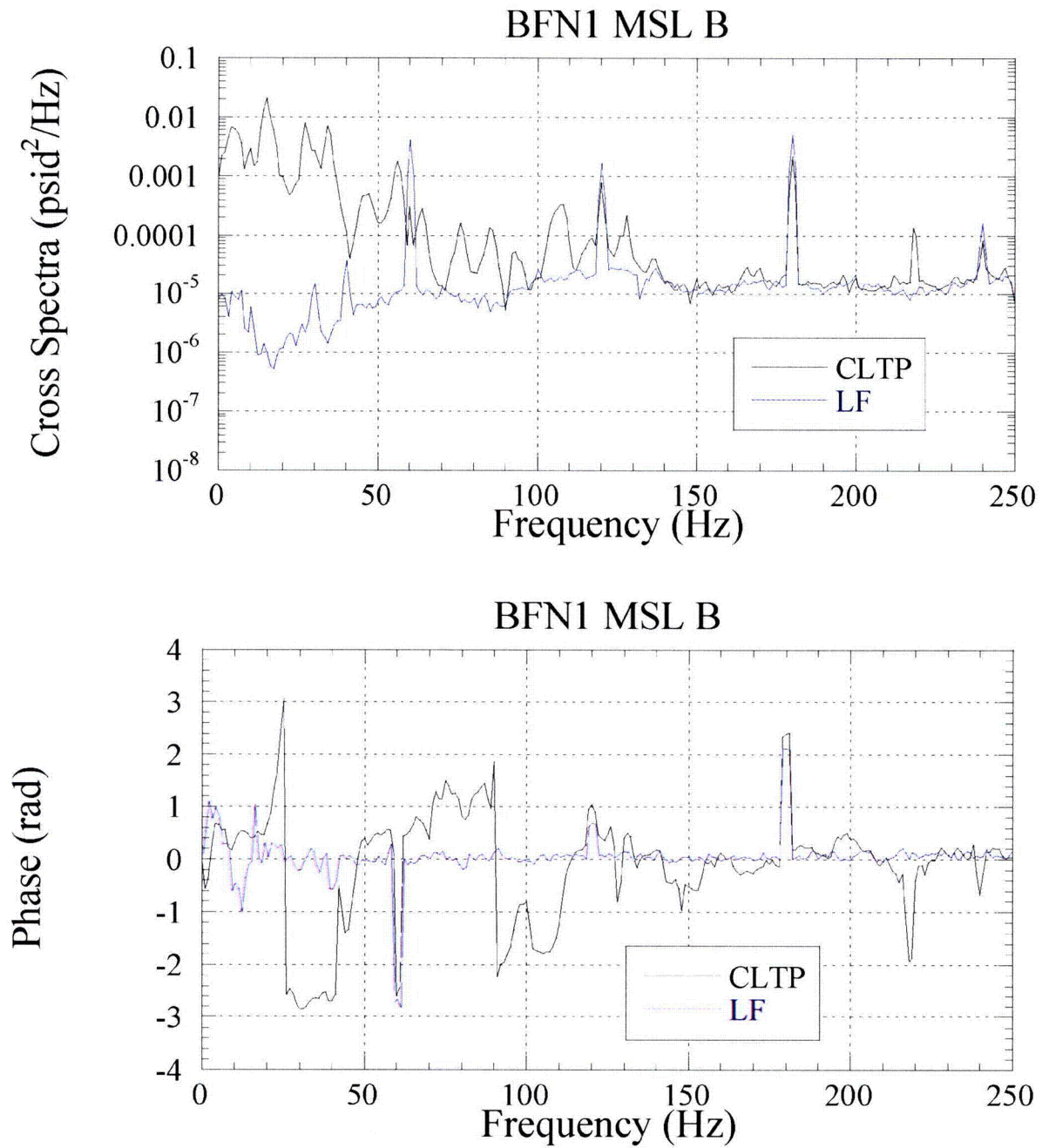


Figure EMCB.202/163-1b. Cross Spectra for BFN1 main steam line B: magnitude (top) and phase (bottom) for CLTP conditions (black) and corresponding EIC magnitude (red).

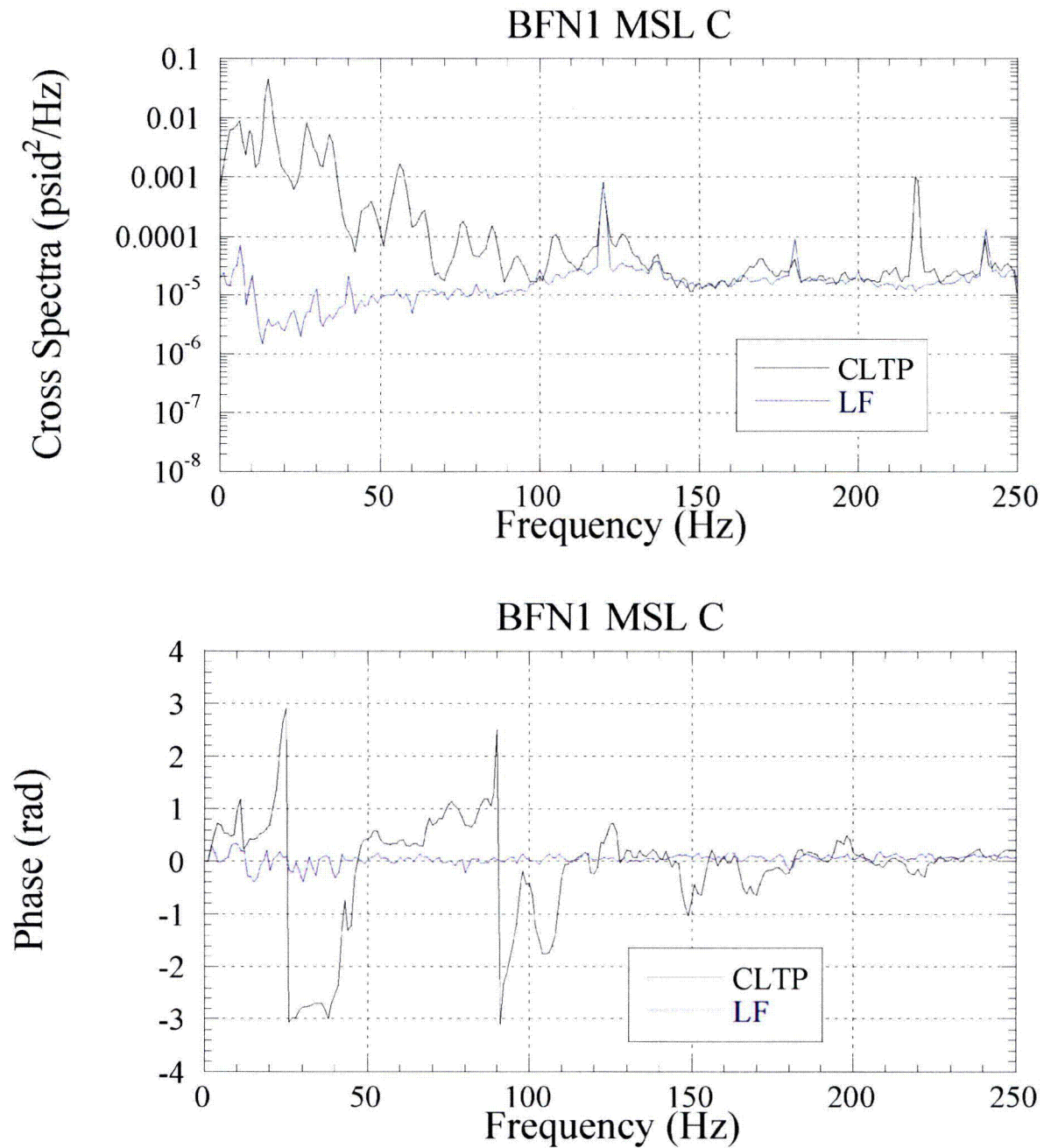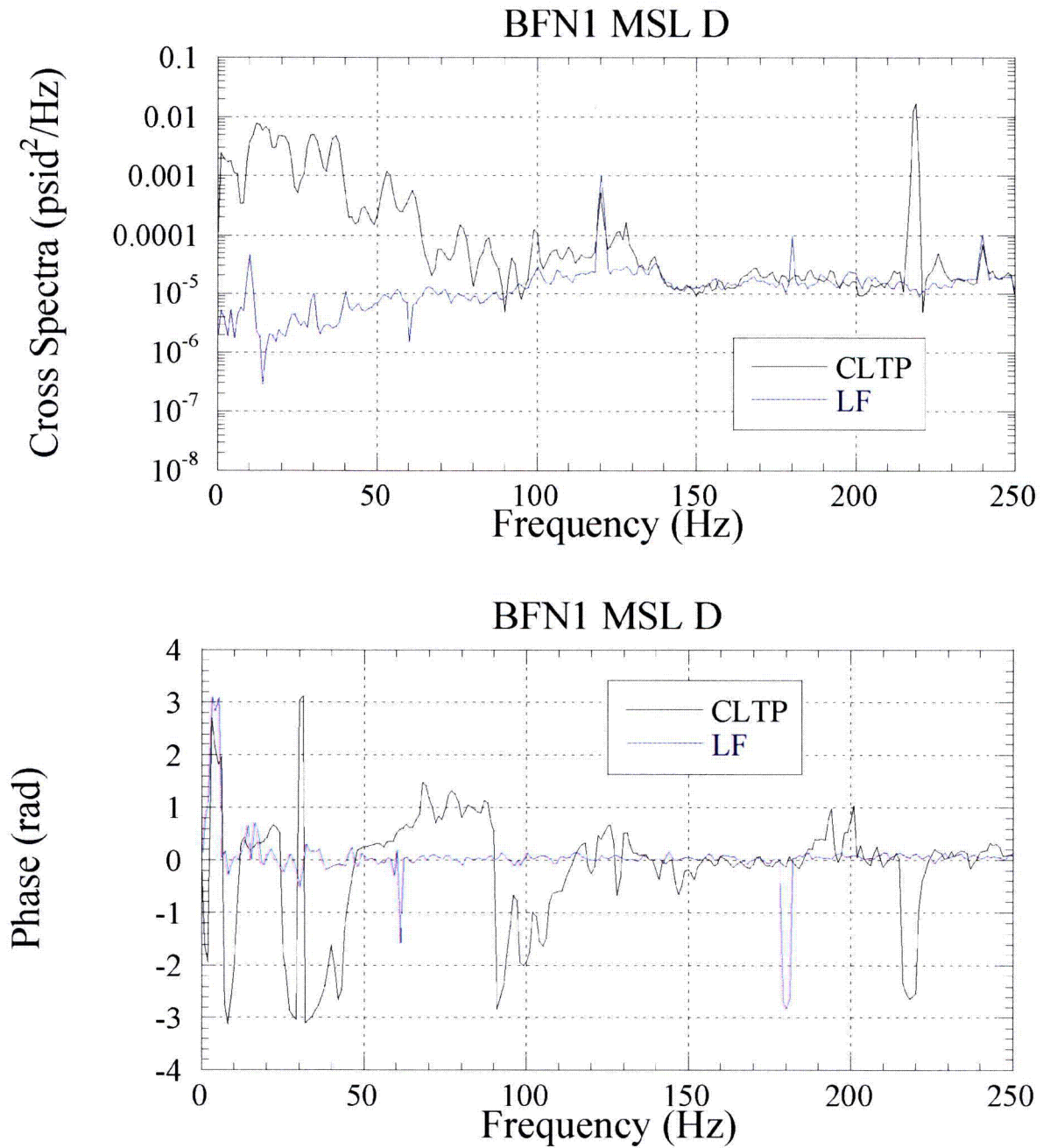Figure EMCB.202/163-1c. Cross Spectra for BFN1 main steam line C: magnitude (top) and phase (bottom) for CLTP conditions (black) and corresponding EIC magnitude (red).

Figure EMCB.202/163-1d. Cross Spectra for BFN1 main steam line D: magnitude (top) and phase (bottom) for CLTP conditions (black) and corresponding EIC magnitude (red).
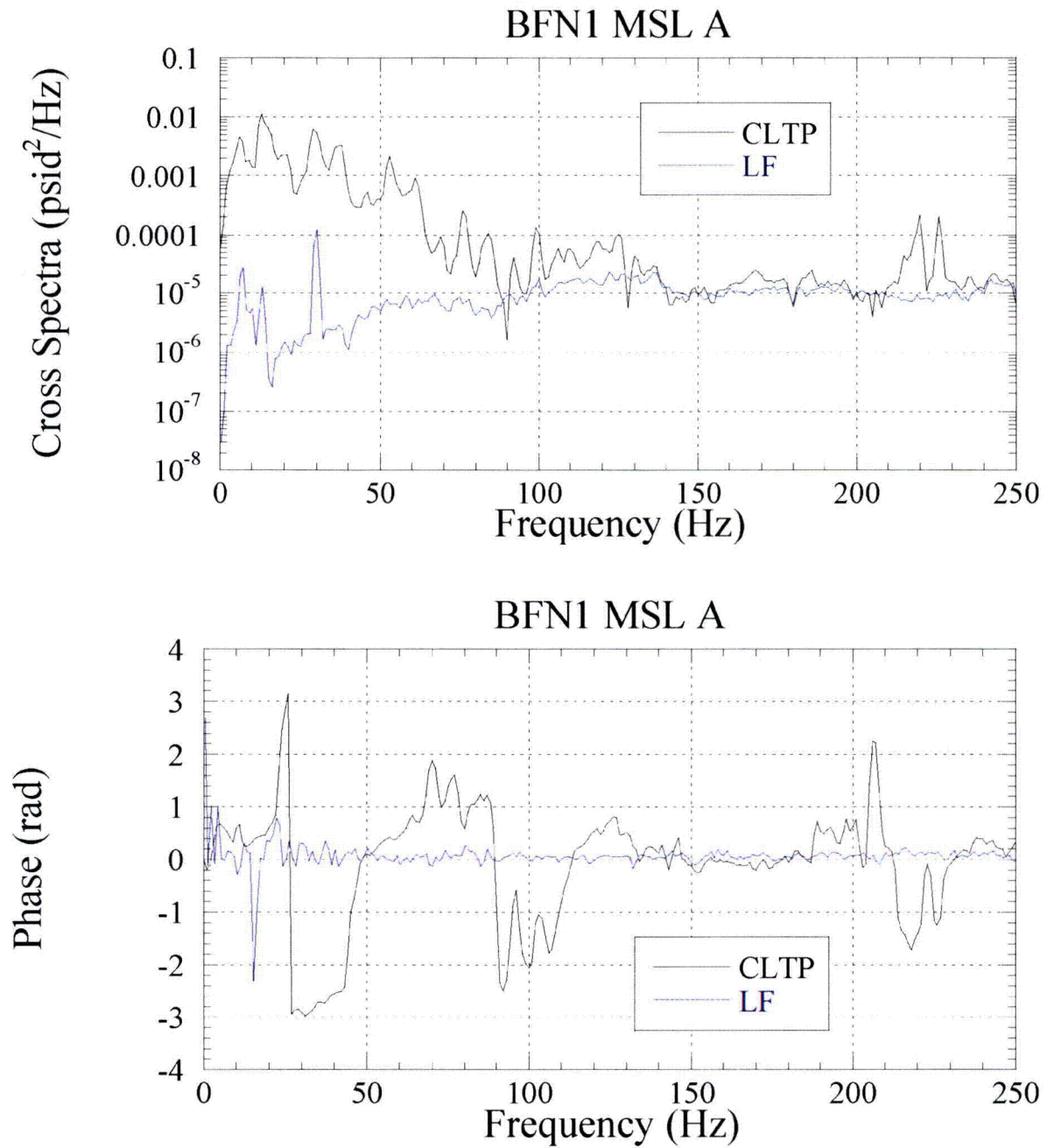
## BFN1 MSL A



## BFN1 MSL A LF



Figure EMCB.202/163-2a. Cross Spectra for BFN1 main steam line A: magnitude (top) and phase (bottom) for LF conditions (black) and corresponding EIC magnitude (red).
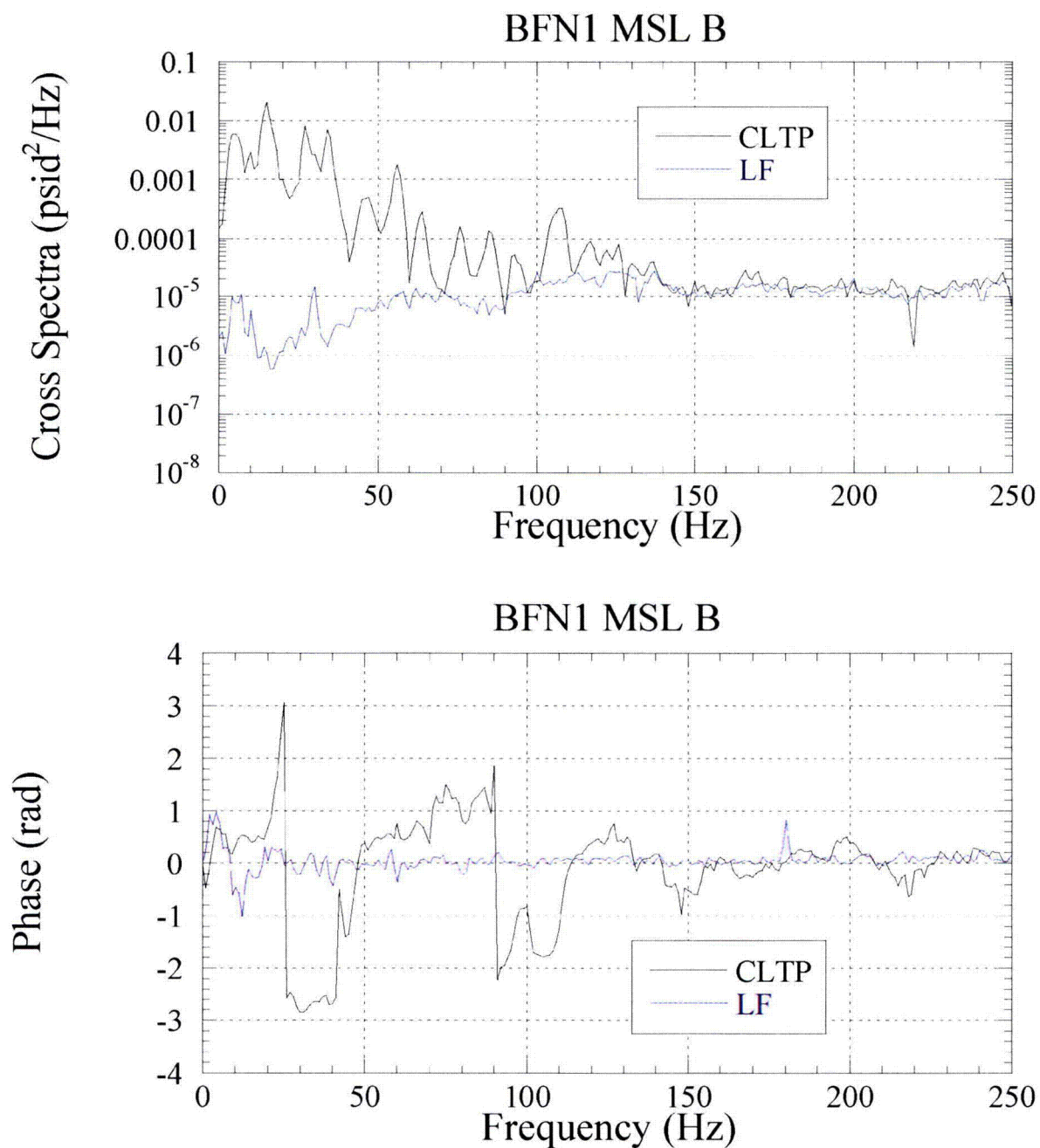
Figure EMCB.202/163-2b. Cross Spectra for BFN1 main steam line B: magnitude (top) and phase (bottom) for LF conditions (black) and corresponding EIC magnitude (red).

Figure EMCB.202/163-2c. Cross Spectra for BFN1 main steam line C: magnitude (top) and phase (bottom) for LF conditions (black) and corresponding EIC magnitude (red).

Figure EMCB.202/163-2d. Cross Spectra for BFN1 main steam line D: magnitude (top) and phase (bottom) for LF conditions (black) and corresponding EIC magnitude (red).
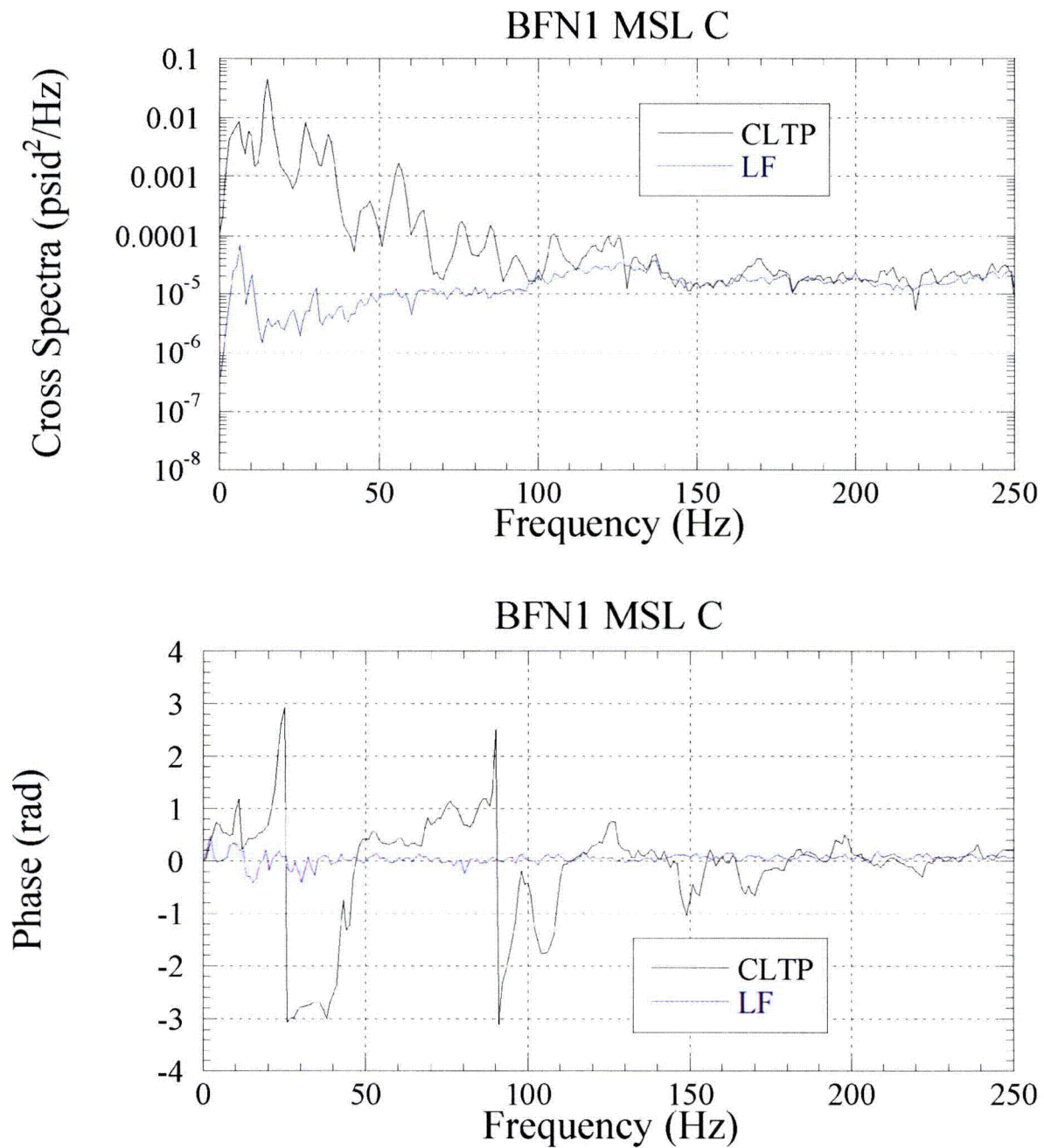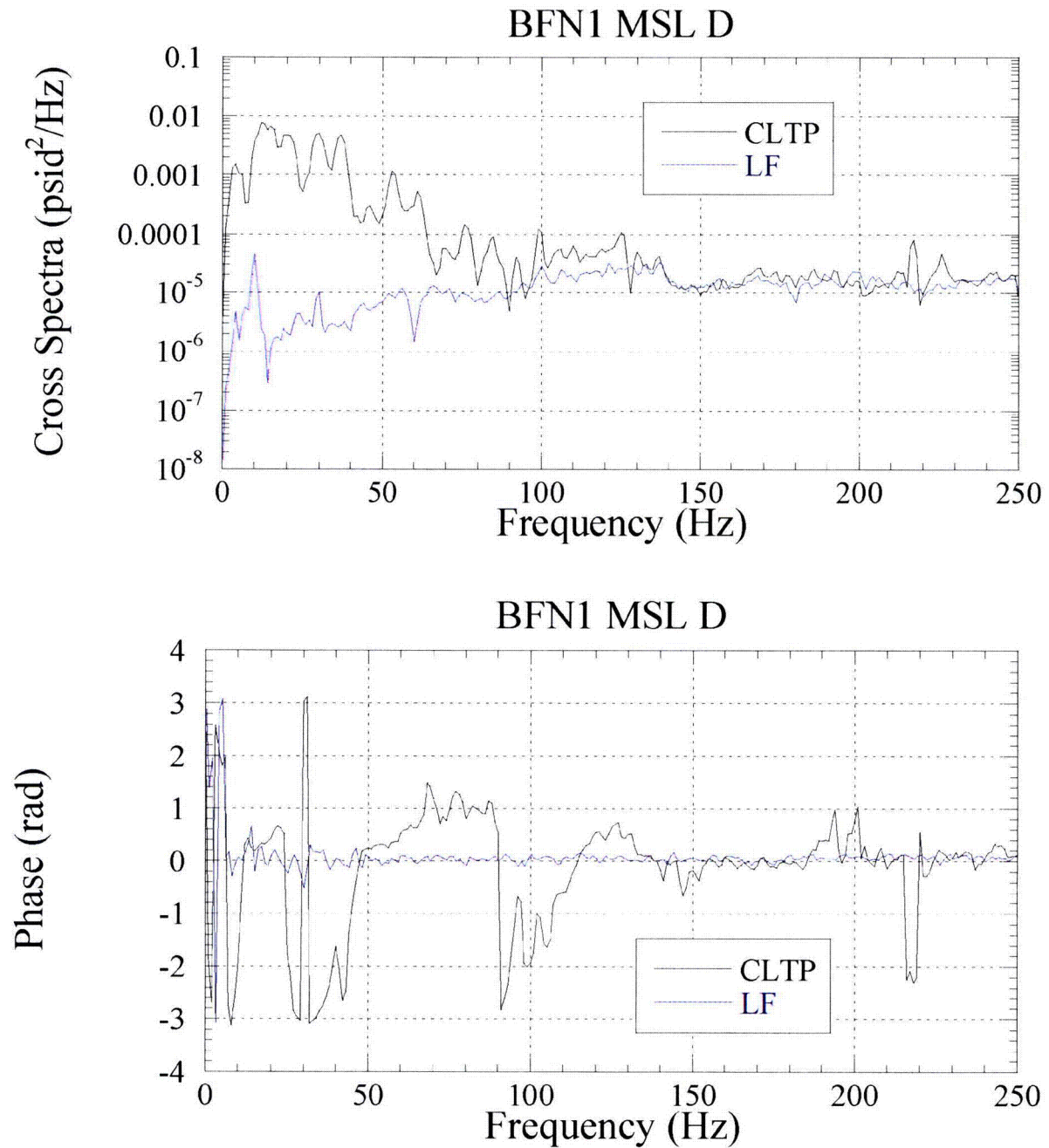
## BFN1 MSL A



## BFN1 MSL A



Figure EMCB.202/163-3a. Cross Spectra for BFN1 main steam line A: magnitude (top) and phase (bottom) for CLTP (black) and LF (blue) conditions, with EIC removed.

Figure EMCB.202/163-3b. Cross Spectra for BFN1 main steam line B: magnitude (top) and phase (bottom) for CLTP (black) and LF (blue) conditions, with EIC removed.

## BFN1 MSL C



## BFN1 MSL C



Figure EMCB.202/163-3c. Cross Spectra for BFN1 main steam line C: magnitude (top) and phase (bottom) for CLTP (black) and LF (blue) conditions, with EIC removed.

## BFN1 MSL D



## BFN1 MSL D



Figure EMCB.202/163-3d. Cross Spectra for BFN1 main steam line D: magnitude (top) and phase (bottom) for CLTP (black) and LF (blue) conditions, with EIC removed.

## BFN1 MSL A



## BFN1 MSL A



Figure EMCB.202/163-4a. Cross Spectra for BFN1 main steam line A: magnitude (top) and phase (bottom) for CLTP (black) and LF (blue) conditions, with notch filtering.

## BFN1 MSL B



## BFN1 MSL B



Figure EMCB.202/163-4b. Cross Spectra for BFN1 main steam line B: magnitude (top) and phase (bottom) for CLTP (black) and LF (blue) conditions, with notch filtering.

## BFN1 MSL C



## BFN1 MSL C



Figure EMCB.202/163-4c. Cross Spectra for BFN1 main steam line C: magnitude (top) and phase (bottom) for CLTP (black) and LF (blue) conditions, with notch filtering.

## BFN1 MSL D



## BFN1 MSL D



Figure EMCB.202/163-4d. Cross Spectra for BFN1 main steam line D: magnitude (top) and phase (bottom) for CLTP (black) and LF (blue) conditions, with notch filtering.
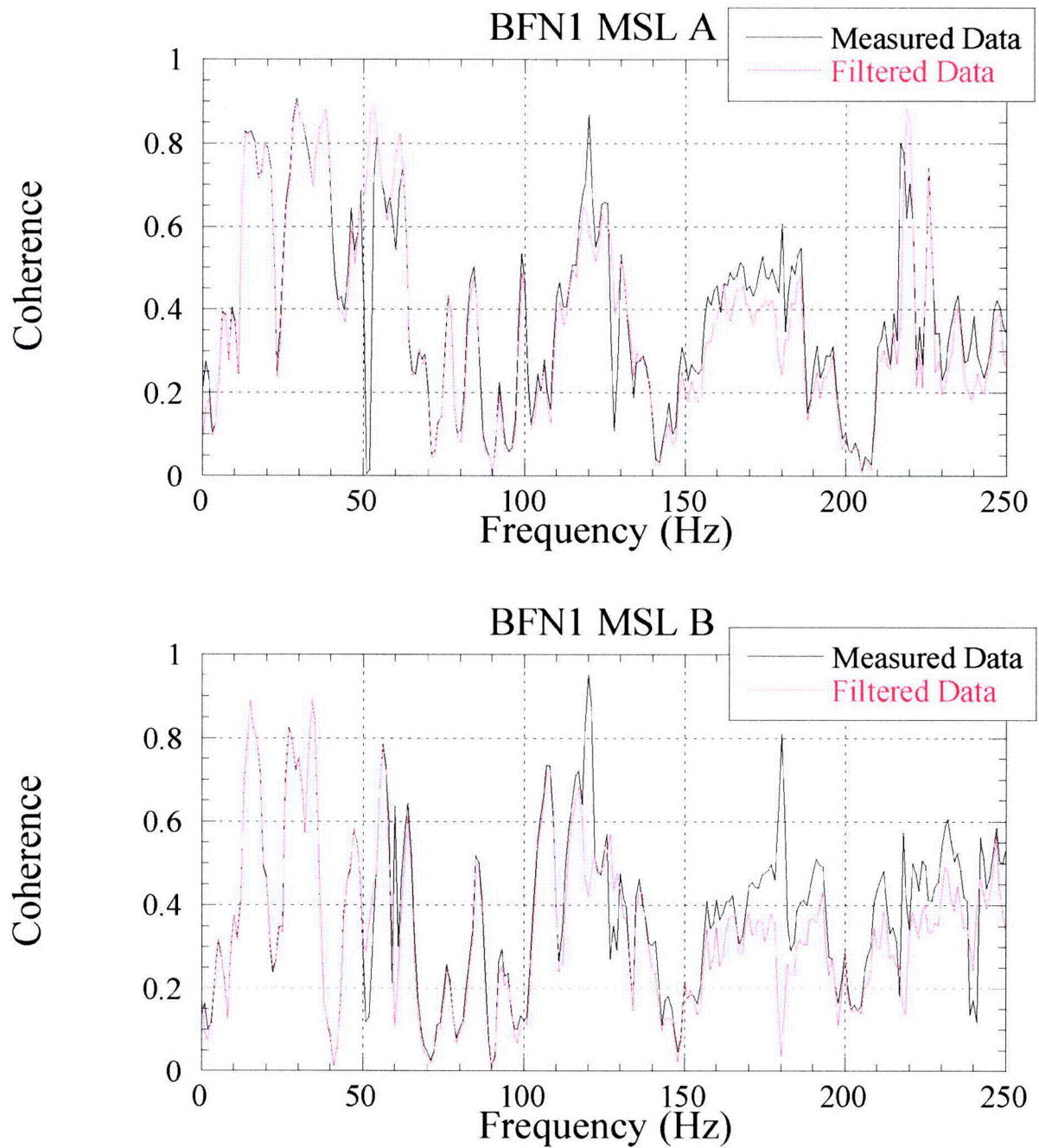
Figure EMCB.202/163-5a. Coherence for BFN1 main steam line A (top) and B (bottom) for CLTP conditions, measured data (black) and EIC removed and notch filtered (red).
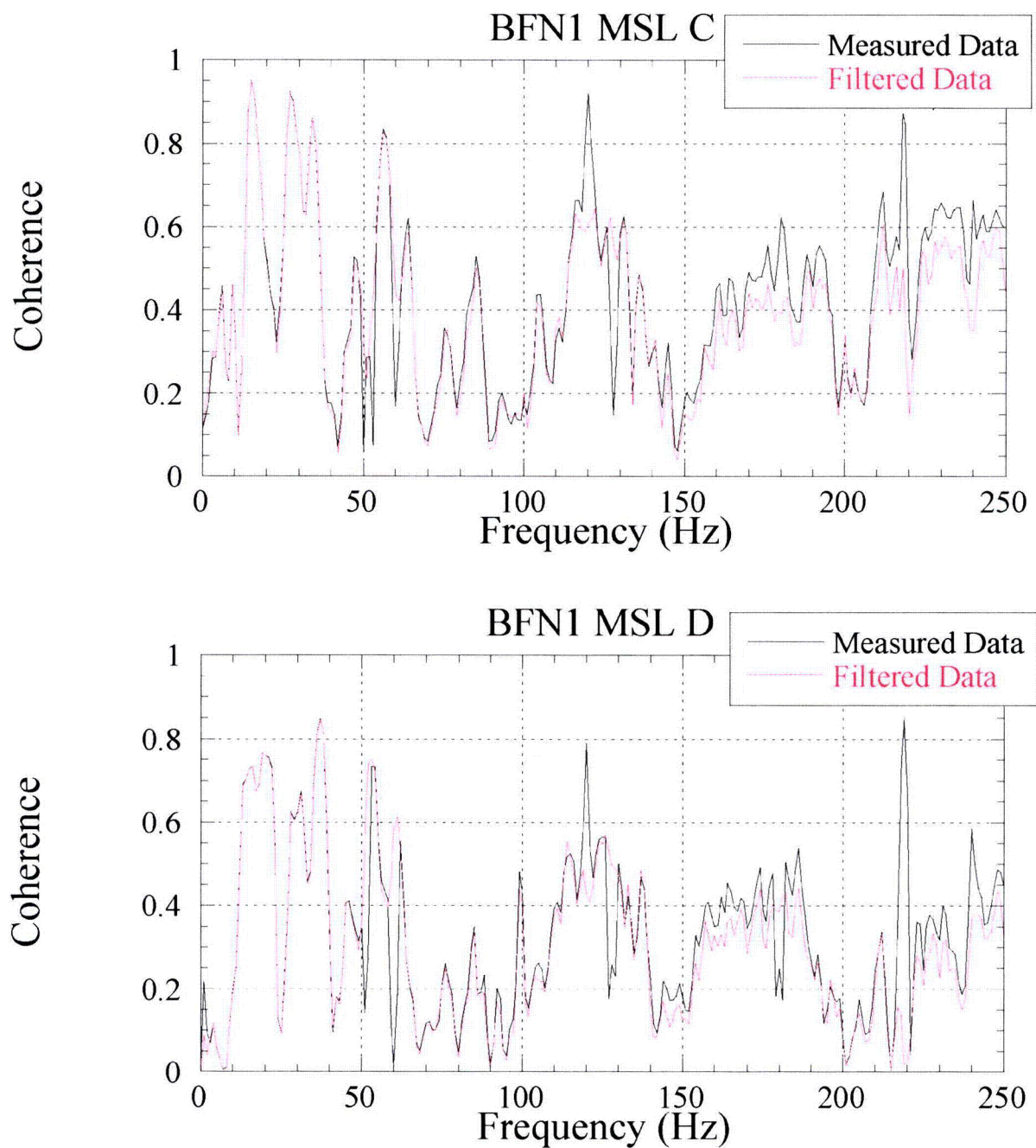
Figure EMCB.202/163-5b. Coherence for BFN1 main steam line C (top) and D (bottom) for CLTP conditions, measured data (black) and EIC removed and notch filtered (red).

## BFN1 MSL A



## BFN1 MSL B
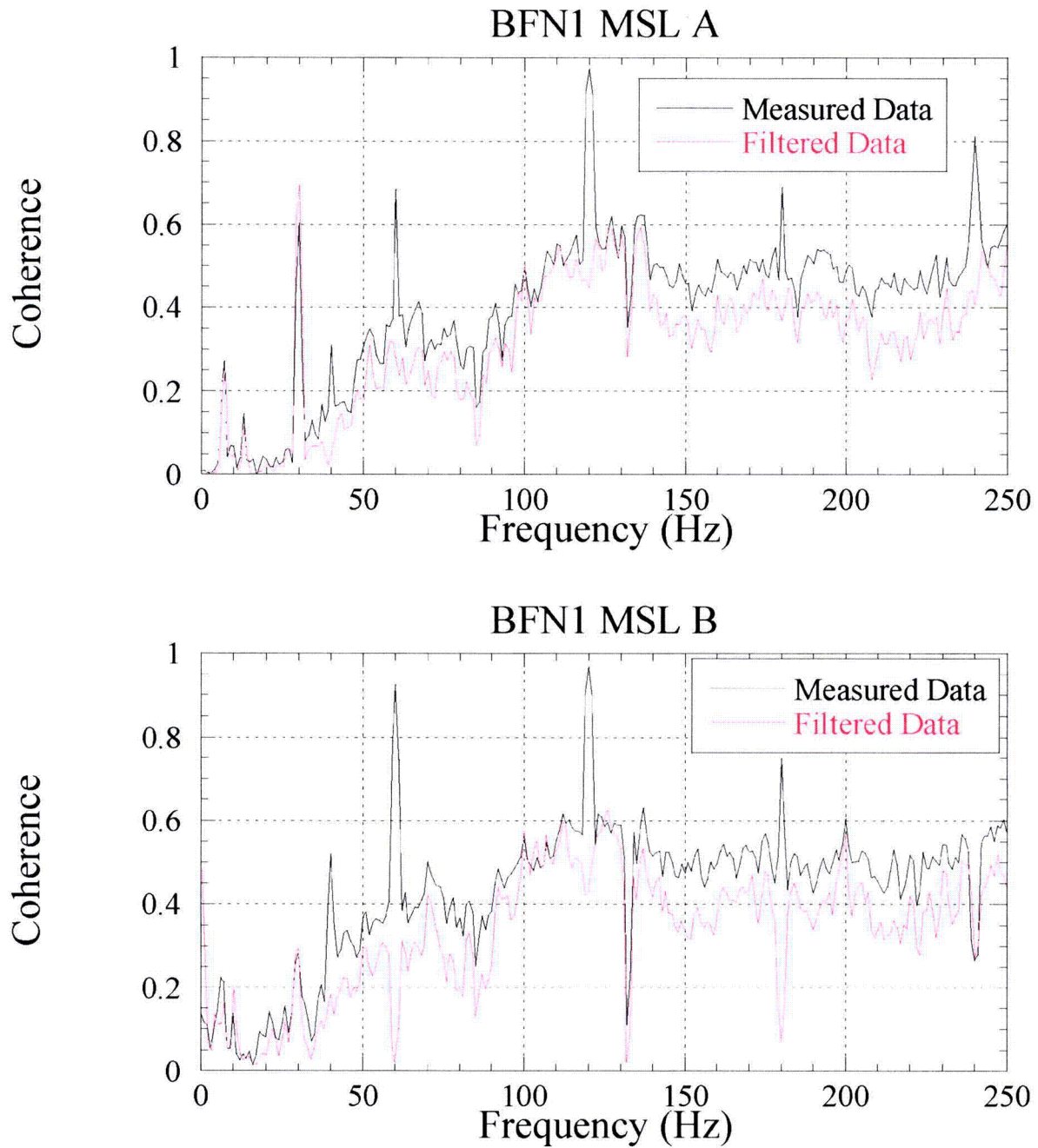


Figure EMCB.202/163-6a. Coherence for BFN1 main steam line A (top) and B (bottom) for LF conditions, measured data (black) and EIC removed and notch filtered (red).
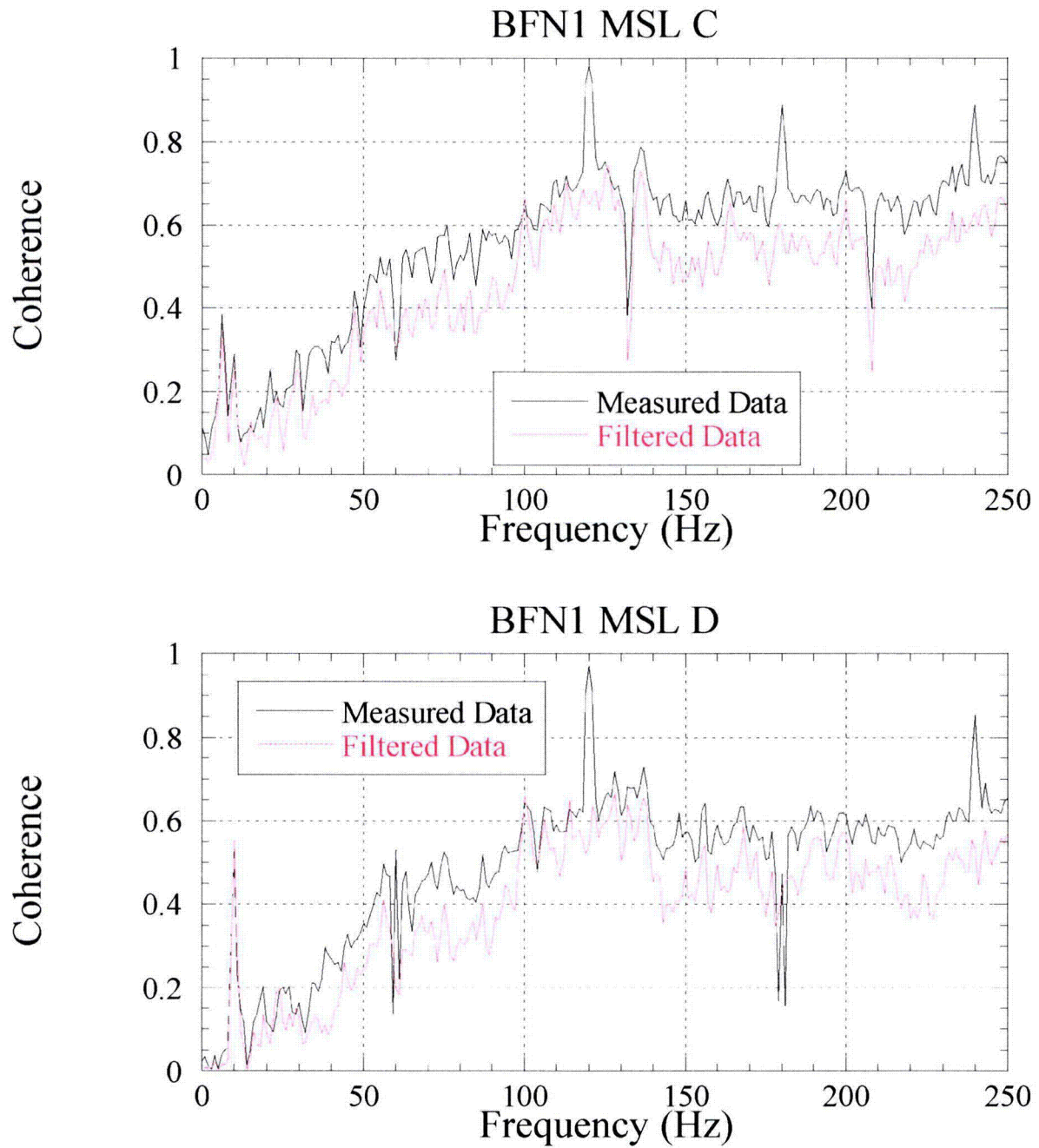
Figure EMCB.202/163-6b. Coherence for BFN1 main steam line C (top) and D (bottom) for LF conditions, measured data (black) and EIC removed and notch filtered (red).

## NRC RAI EMCB.203/164 (Units 1 and 2)

In response to EMCB.200/157., TVA presents detailed discussion of signal conditioning in six steps. Provide plots of strain gage signals (autospectra, cross spectra, coherence, and phase) and computed [[                                ]] throughout the procedure described in their RAI response (prior to step 1, after step 1, after step 2, after step 4 and after step 6), for current license thermal power (CLTP) and Low Flow (LF) signals, for Units 1 and 2.

## TVA Response to EMCB.203/164 (Units 1 and 2)

The requested plots for Unit 1 are listed and provided below. The requested plots for Unit 2 are scheduled to be provided by January 23, 2009.

**Prior to Step 1: Measured Data**

| Figure EMCB.203- | Contents |
|---|---|
| 1.1a | Power spectral density (PSD) of main steam line A upper and lower for CLTP and EIC |
| 1.1b | PSD of main steam line B upper and lower for CLTP and EIC |
| 1.1c | PSD of main steam line C upper and lower for CLTP and EIC |
| 1.1d | PSD of main steam line D upper and lower for CLTP and EIC |
| 1.2a | Cross spectra and coherence of main steam line A for CLTP and EIC |
| 1.2b | Cross spectra and coherence of main steam line B for CLTP and EIC |
| 1.2c | Cross spectra and coherence of main steam line C for CLTP and EIC |
| 1.2d | Cross spectra and coherence of main steam line D for CLTP and EIC |
| 1.3a | Phase of main steam line A for CLTP and EIC |
| 1.3b | Phase of main steam line B for CLTP and EIC |
| 1.3c | Phase of main steam line C for CLTP and EIC |
| 1.3d | Phase of main steam line D for CLTP and EIC |
| [[ | ]] |
| [[ | ]] |
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| 1.5a | PSD of main steam line A upper and lower for LF and EIC |
| 1.5b | PSD of main steam line B upper and lower for LF and EIC |
| 1.5c | PSD of main steam line C upper and lower for LF and EIC |
| 1.5d | PSD of main steam line D upper and lower for LF and EIC |
| 1.6a | Cross spectra and coherence of main steam line A for LF and EIC |
| 1.6b | Cross spectra and coherence of main steam line B for LF and EIC |
| 1.6c | Cross spectra and coherence of main steam line C for LF and EIC |
| 1.6d | Cross spectra and coherence of main steam line D for LF and EIC |
| 1.7a | Phase of main steam line A for LF and EIC |
| 1.7b | Phase of main steam line B for LF and EIC |
| 1.7c | Phase of main steam line C for LF and EIC |
| 1.7d | Phase of main steam line D for LF and EIC |
| [[ | ]] |
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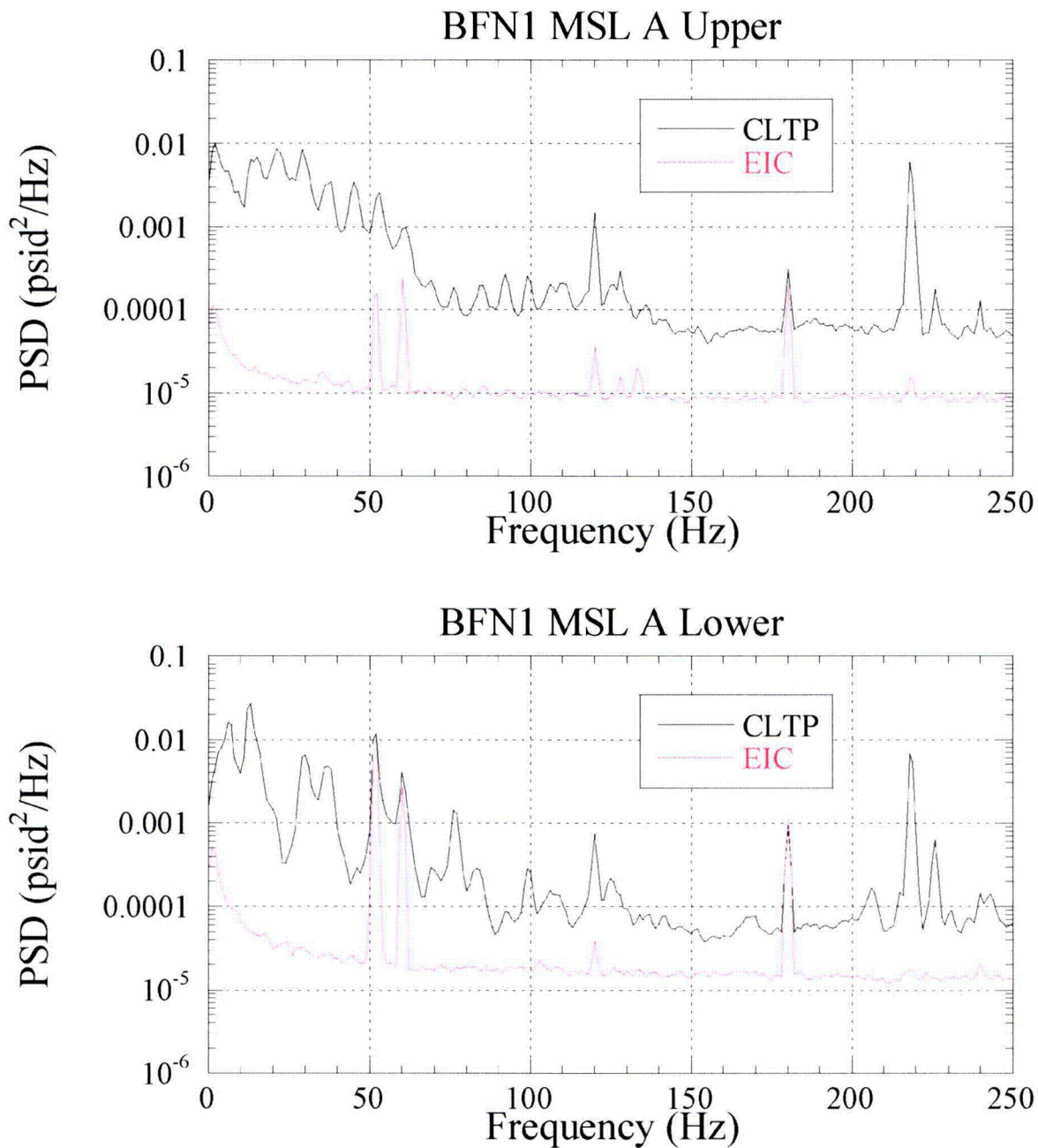## BFN1 MSL A Upper



## BFN1 MSL A Lower



Figure EMCB.203-1.1a: Autospectra of measured data for BFN1 main steam line A: upper strain gage location (top), lower strain gage location (bottom), for CLTP conditions (black) and corresponding EIC (red).
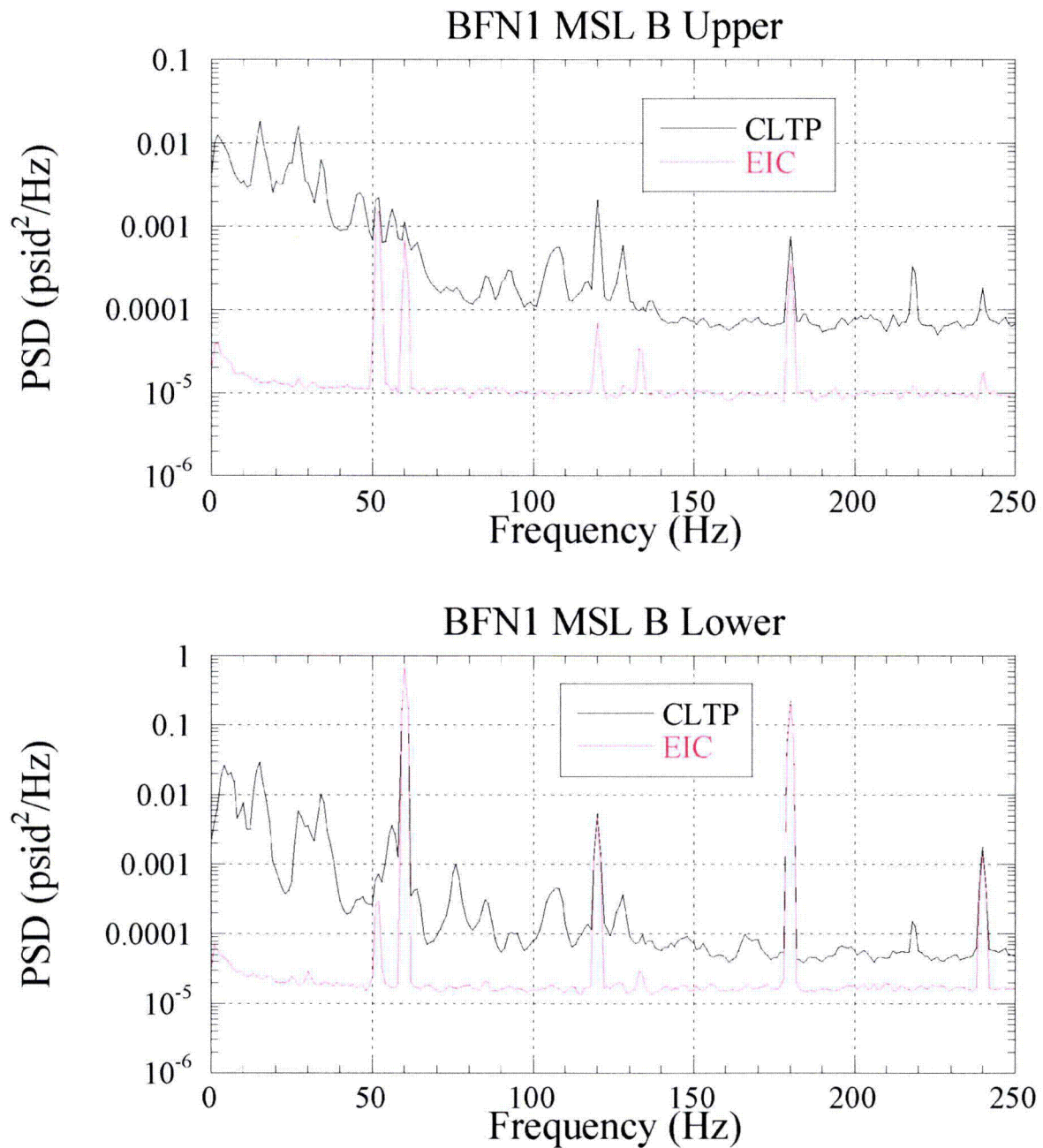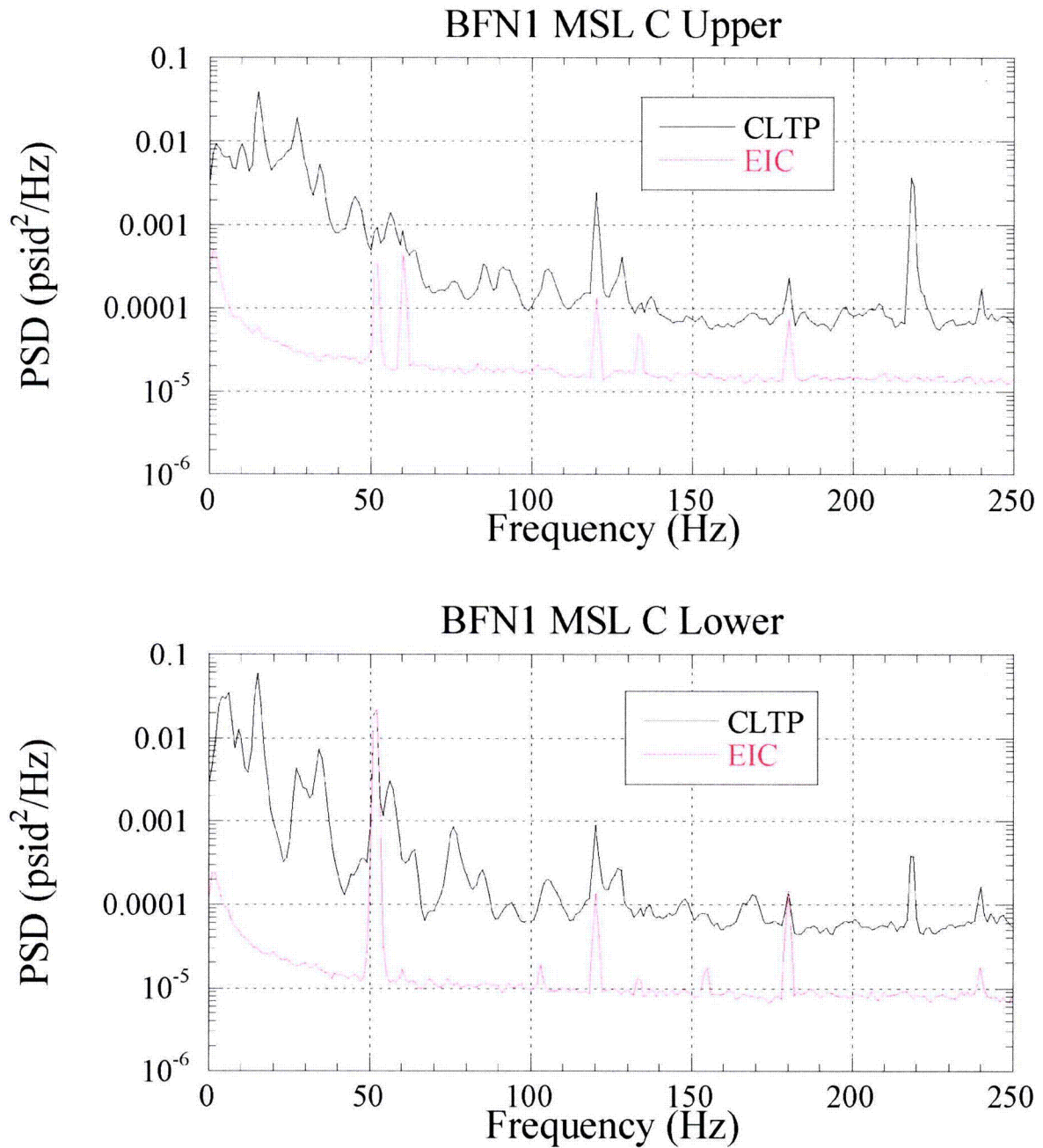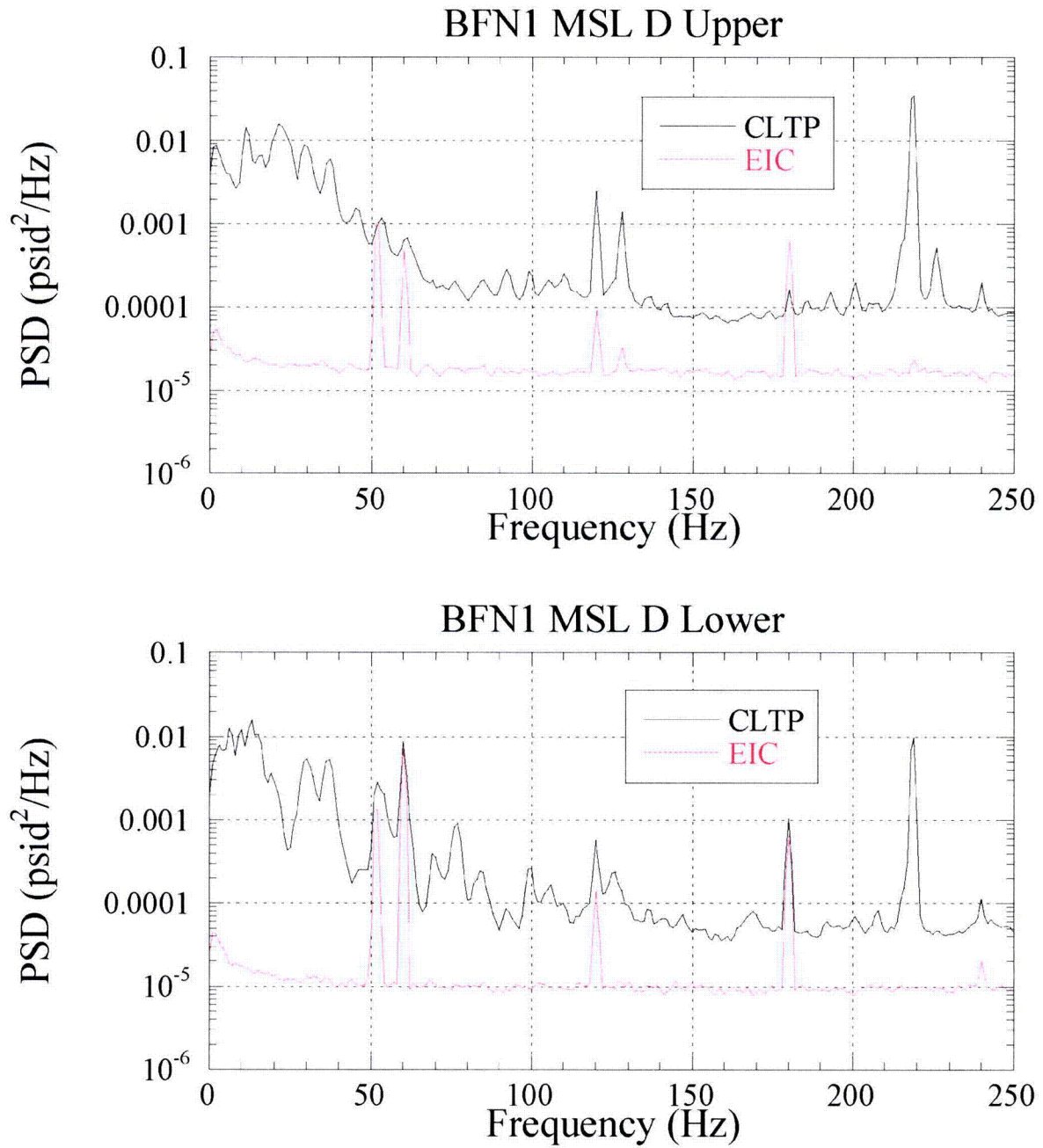
## BFN1 MSL B Upper



## BFN1 MSL B Lower



Figure EMCB.203-1.1b: Autospectra of measured data for BFN1 main steam line B: upper strain gage location (top), lower strain gage location (bottom), for CLTP conditions (black) and corresponding EIC (red).

Figure EMCB.203-1.1c: Autospectra of measured data for BFN1 main steam line C: upper strain gage location (top), lower strain gage location (bottom), for CLTP conditions (black) and corresponding EIC (red).

Figure EMCB.203-1.1d: Autospectra of measured data for BFN1 main steam line D: upper strain gage location (top), lower strain gage location (bottom), for CLTP conditions (black) and corresponding EIC (red).
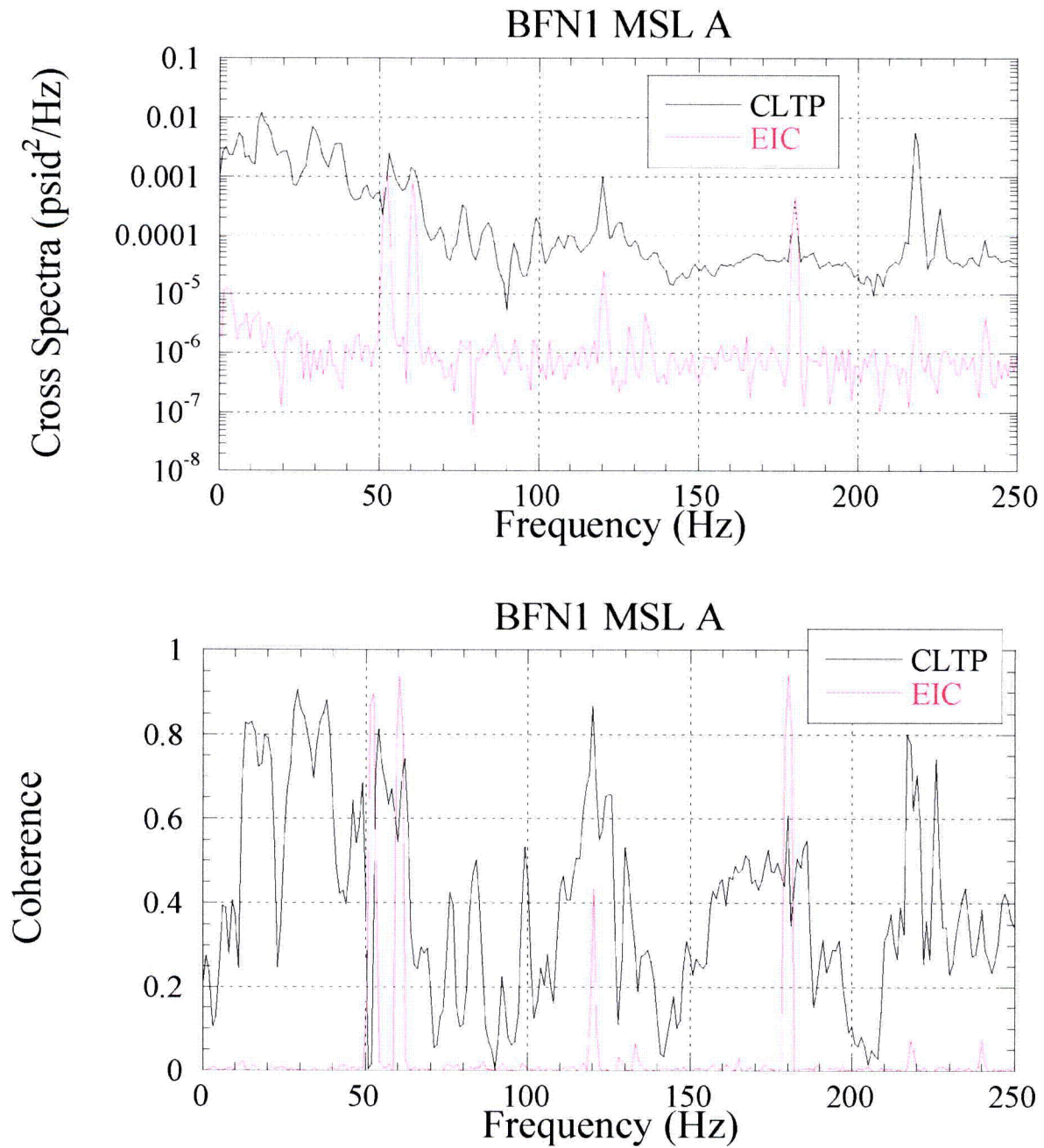
Figure EMCB.203-1.2a: Cross spectra (top) and coherence (bottom) of measured data for BFN1 main steam line A, for CLTP conditions (black) and corresponding EIC (red).
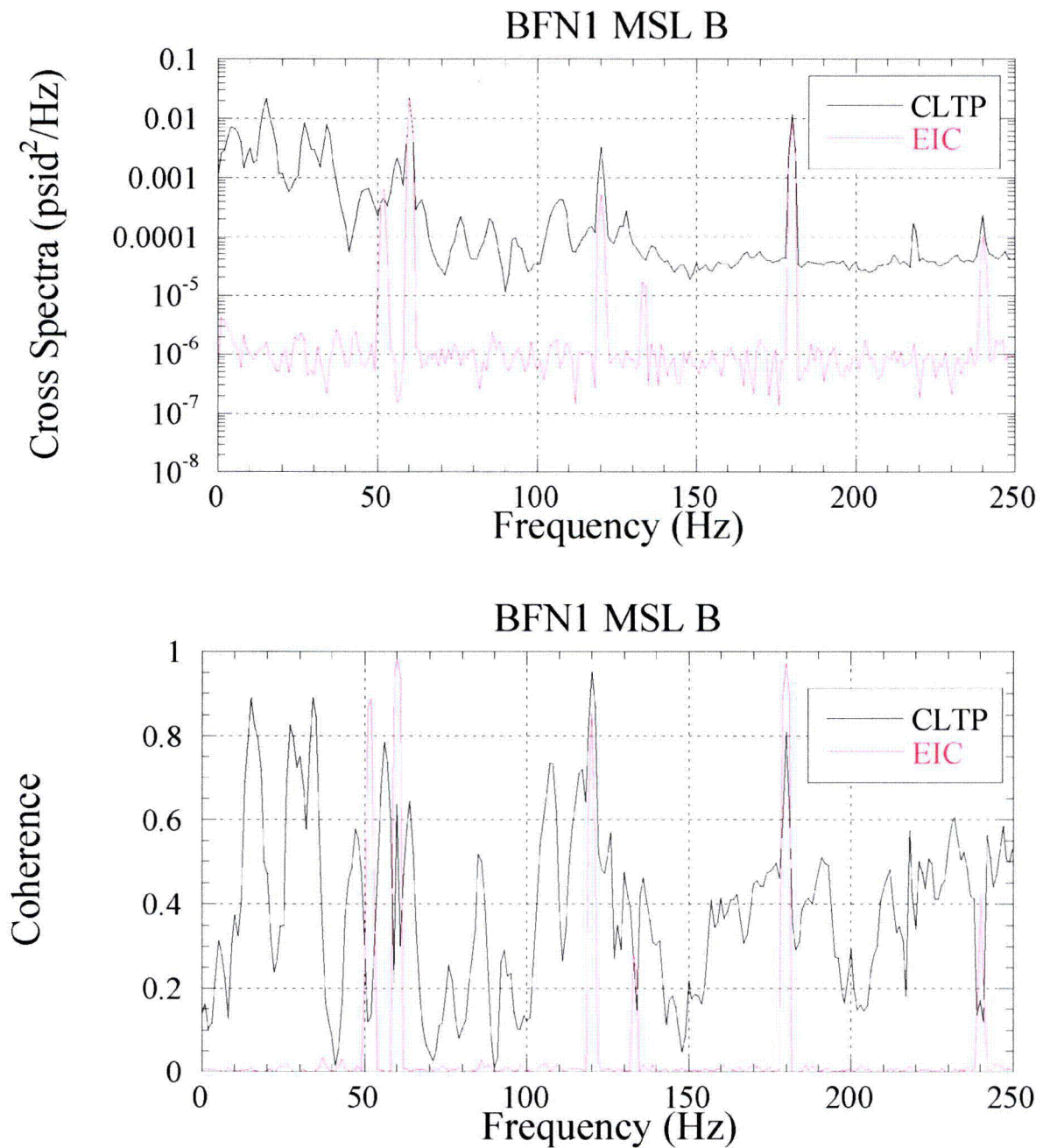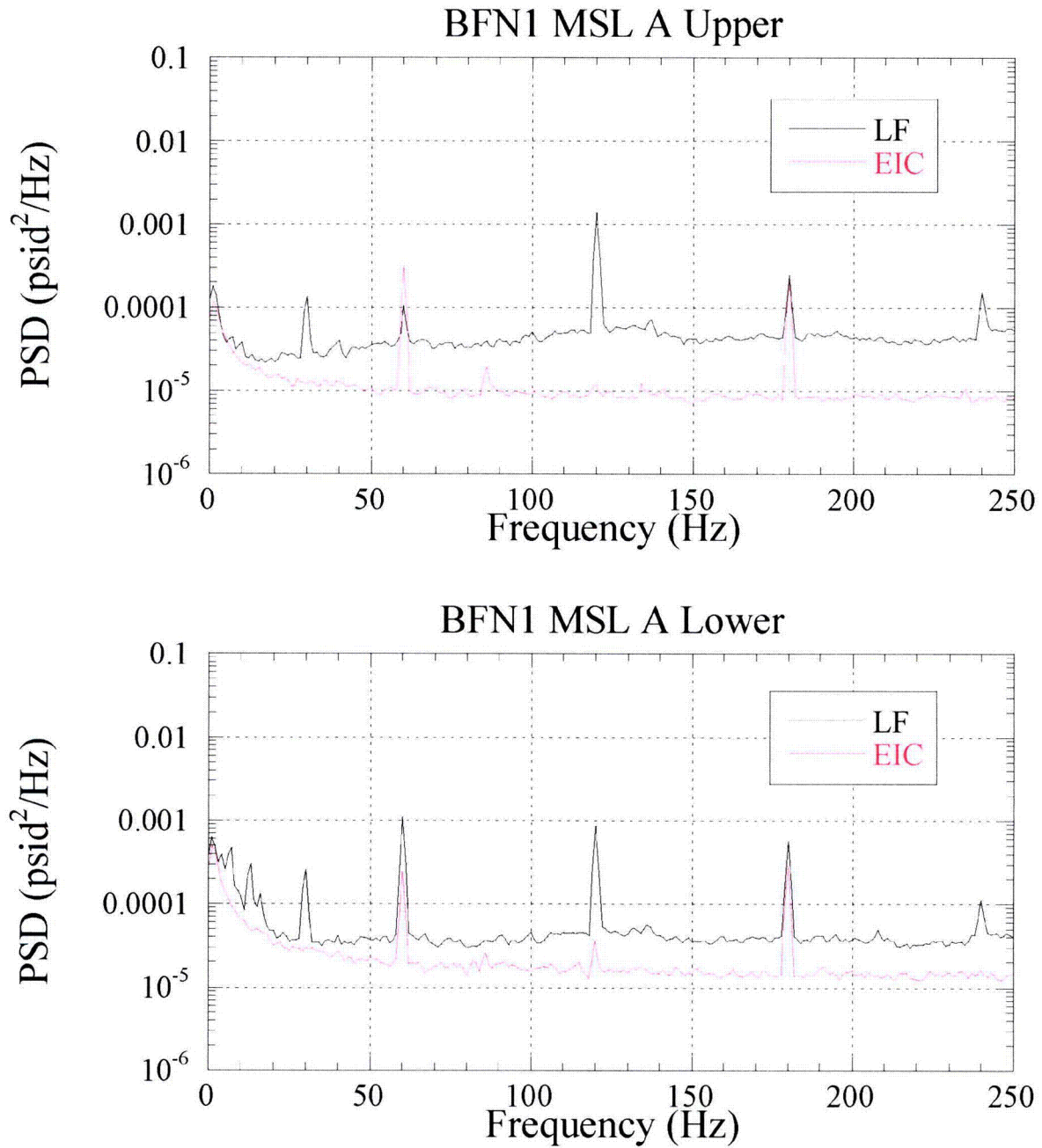
Figure EMCB.203-1.2b: Cross spectra (top) and coherence (bottom) of measured data for BFN1 main steam line B, for CLTP conditions (black) and corresponding EIC (red).
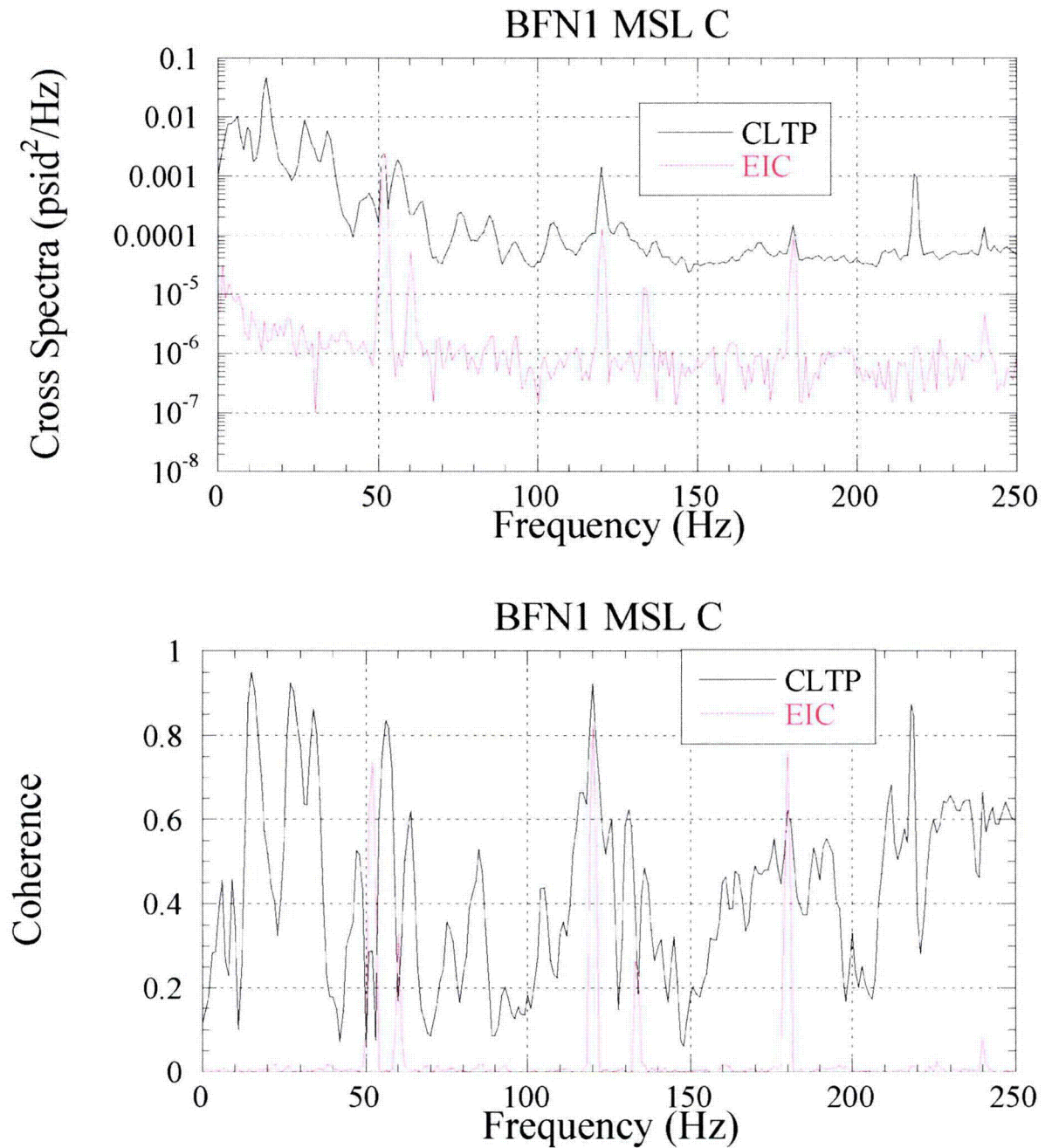
Figure EMCB.203-1.2c: Cross spectra (top) and coherence (bottom) of measured data for BFN1 main steam line C, for CLTP conditions (black) and corresponding EIC (red).
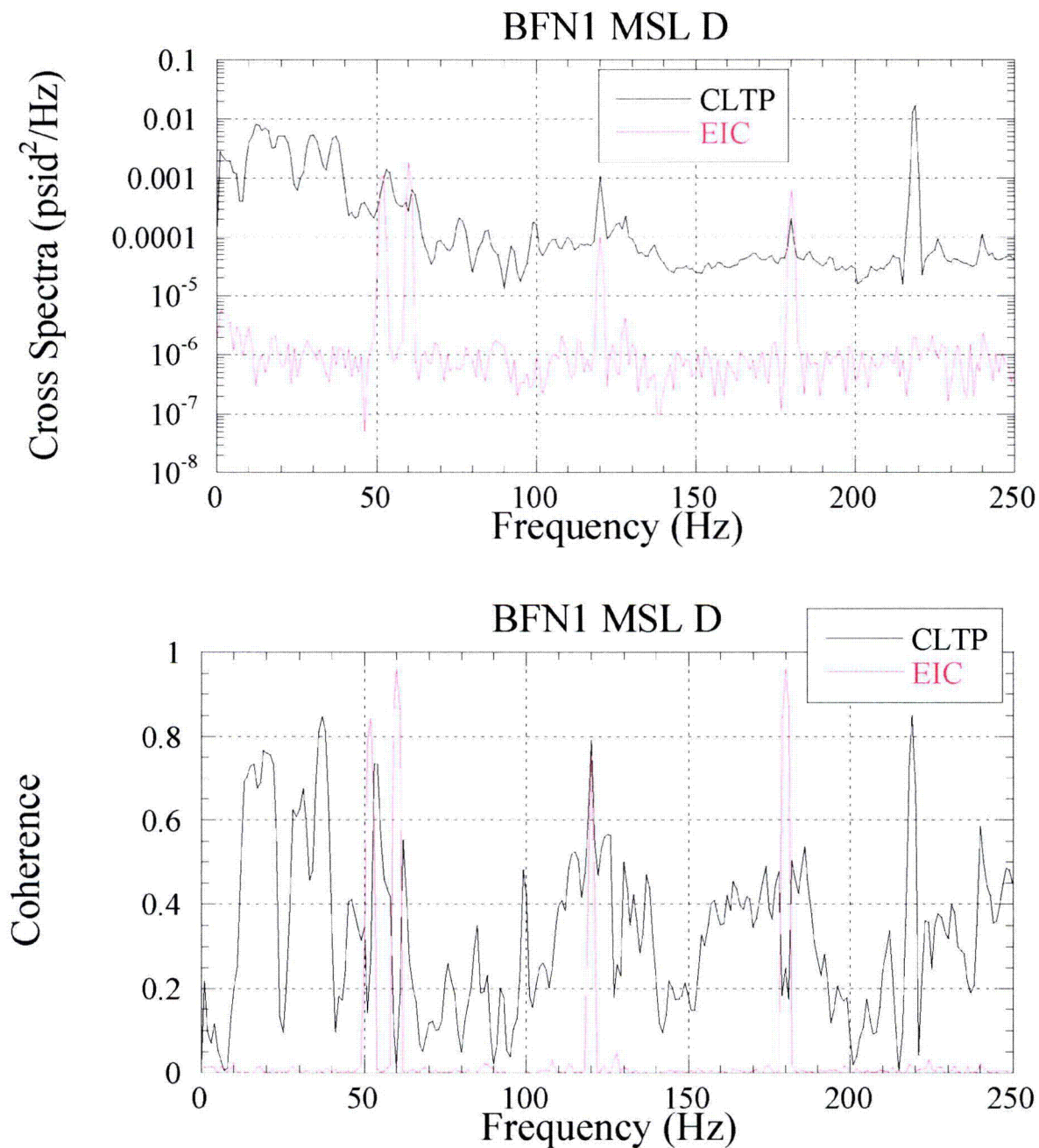
Figure EMCB.203-1.2d: Cross spectra (top) and coherence (bottom) of measured data for BFN1 main steam line D, for CLTP conditions (black) and corresponding EIC (red).
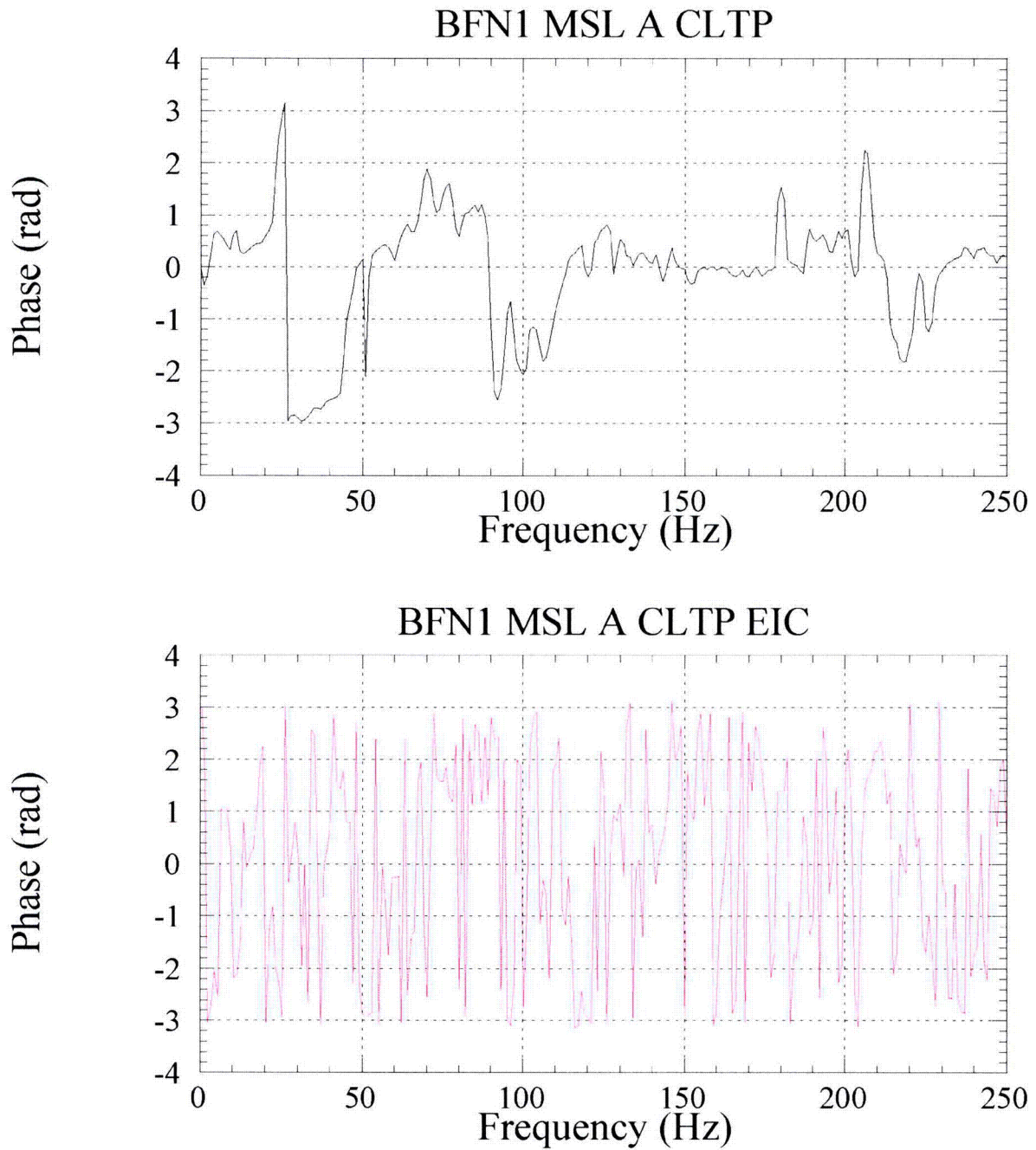
Figure EMCB.203-1.3a: Phase of measured data for BFN1 main steam line A, for CLTP conditions (black, top) and corresponding EIC (red, bottom).

## BFN1 MSL B CLTP



## BFN1 MSL B CLTP EIC
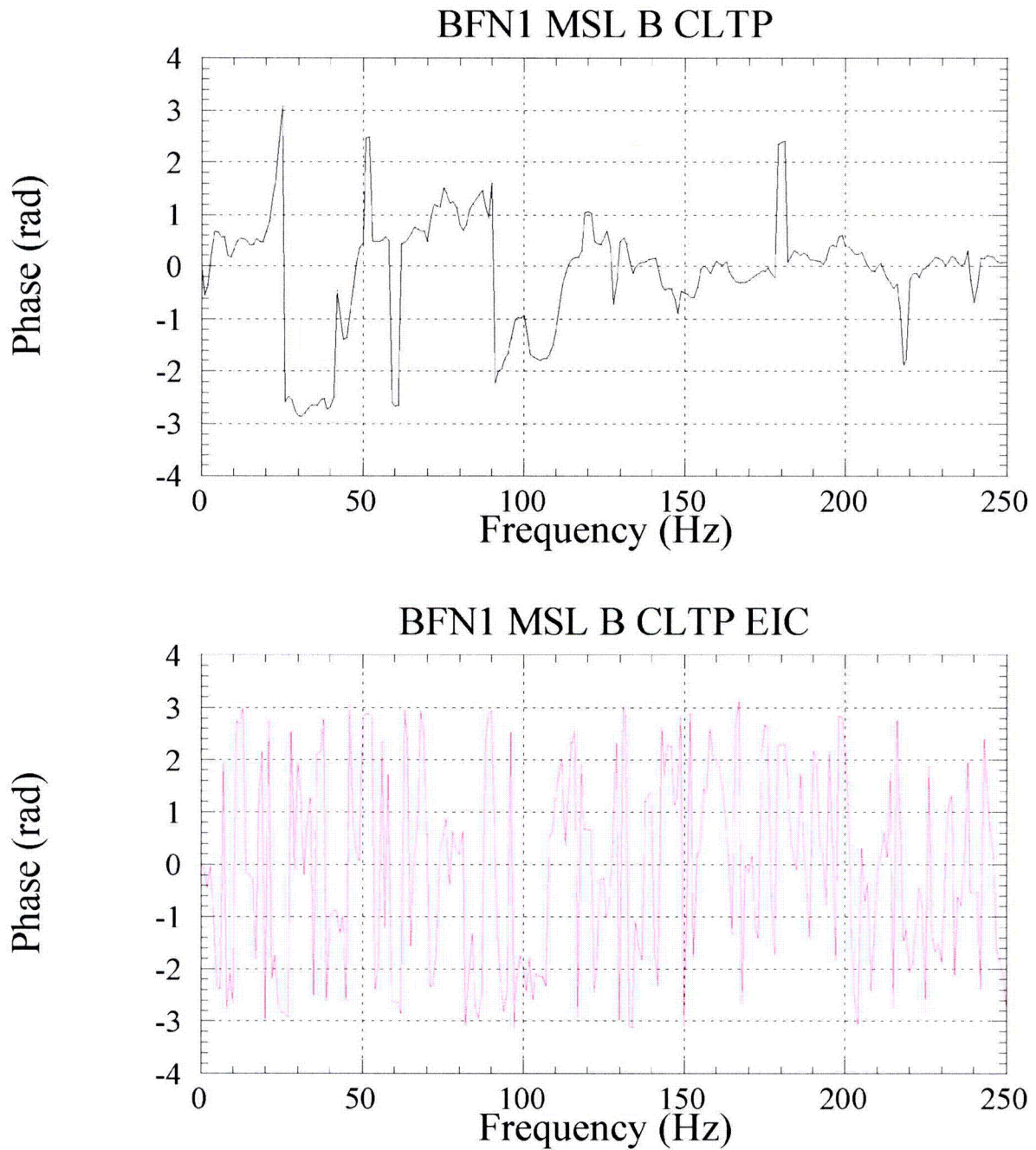


Figure EMCB.203-1.3b: Phase of measured data for BFN1 main steam line B, for CLTP conditions (black, top) and corresponding EIC (red, bottom).
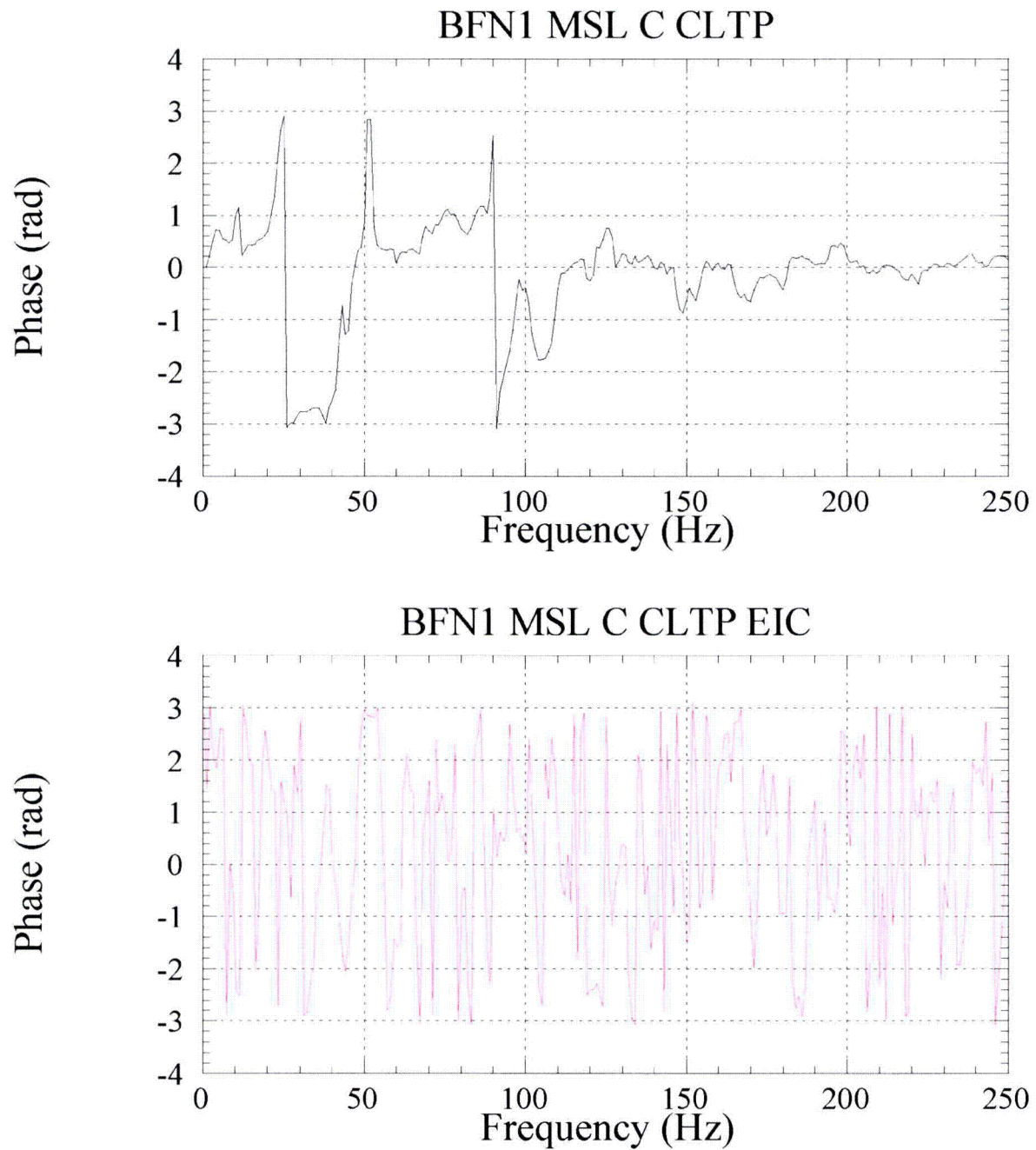
Figure EMCB.203-1.3c: Phase of measured data for BFN1 main steam line C, for CLTP conditions (black, top) and corresponding EIC (red, bottom).
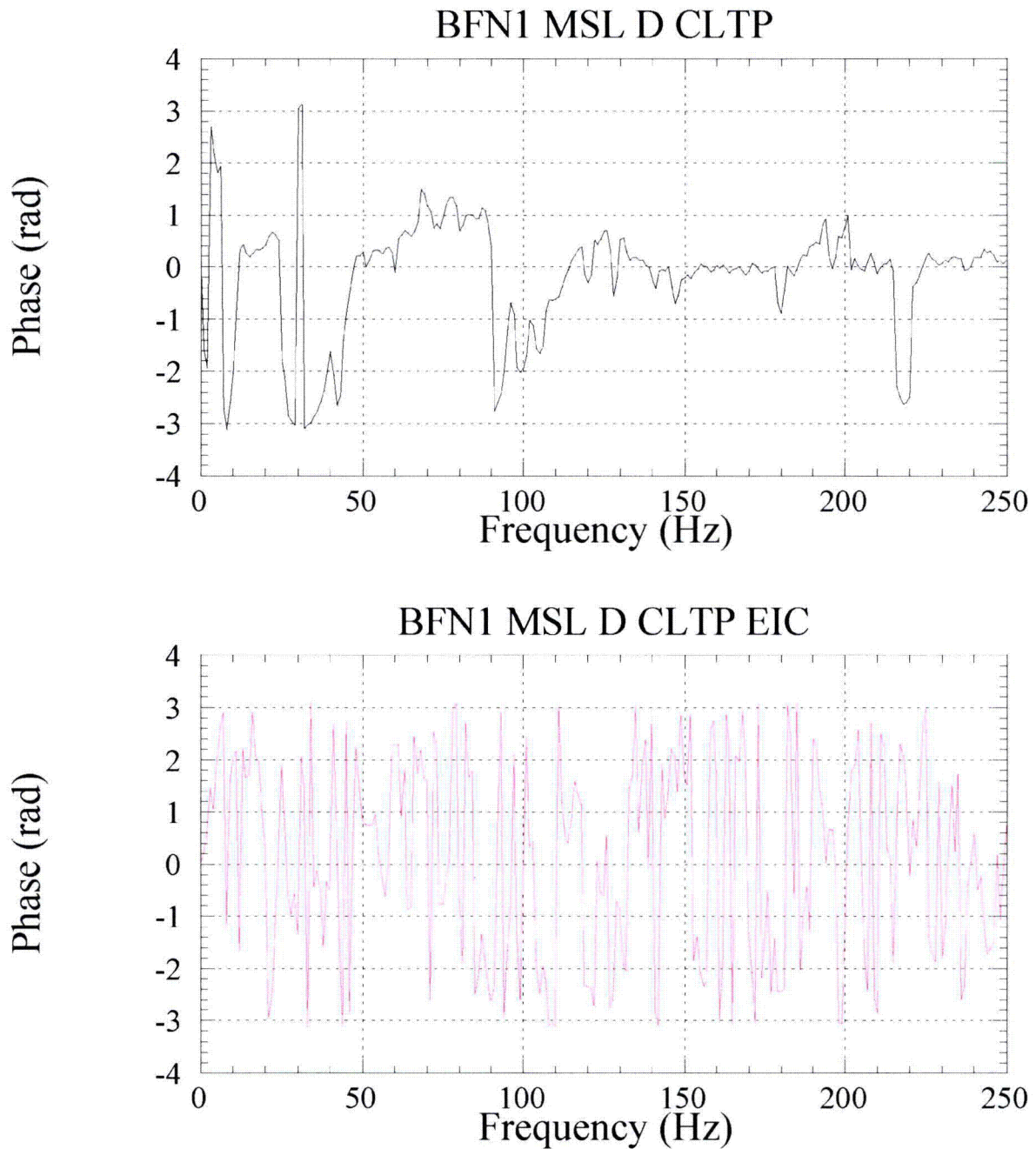
Figure EMCB.203-1.3d: Phase of measured data for BFN1 main steam line D, for CLTP conditions (black, top) and corresponding EIC (red, bottom).

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## BFN1 MSL A Upper



## BFN1 MSL A Lower



Figure EMCB.203-1.5a: Autospectra of measured data for BFN1 main steam line A: upper strain gage location (top), lower strain gage location (bottom), for LF conditions (black) and corresponding EIC (red).
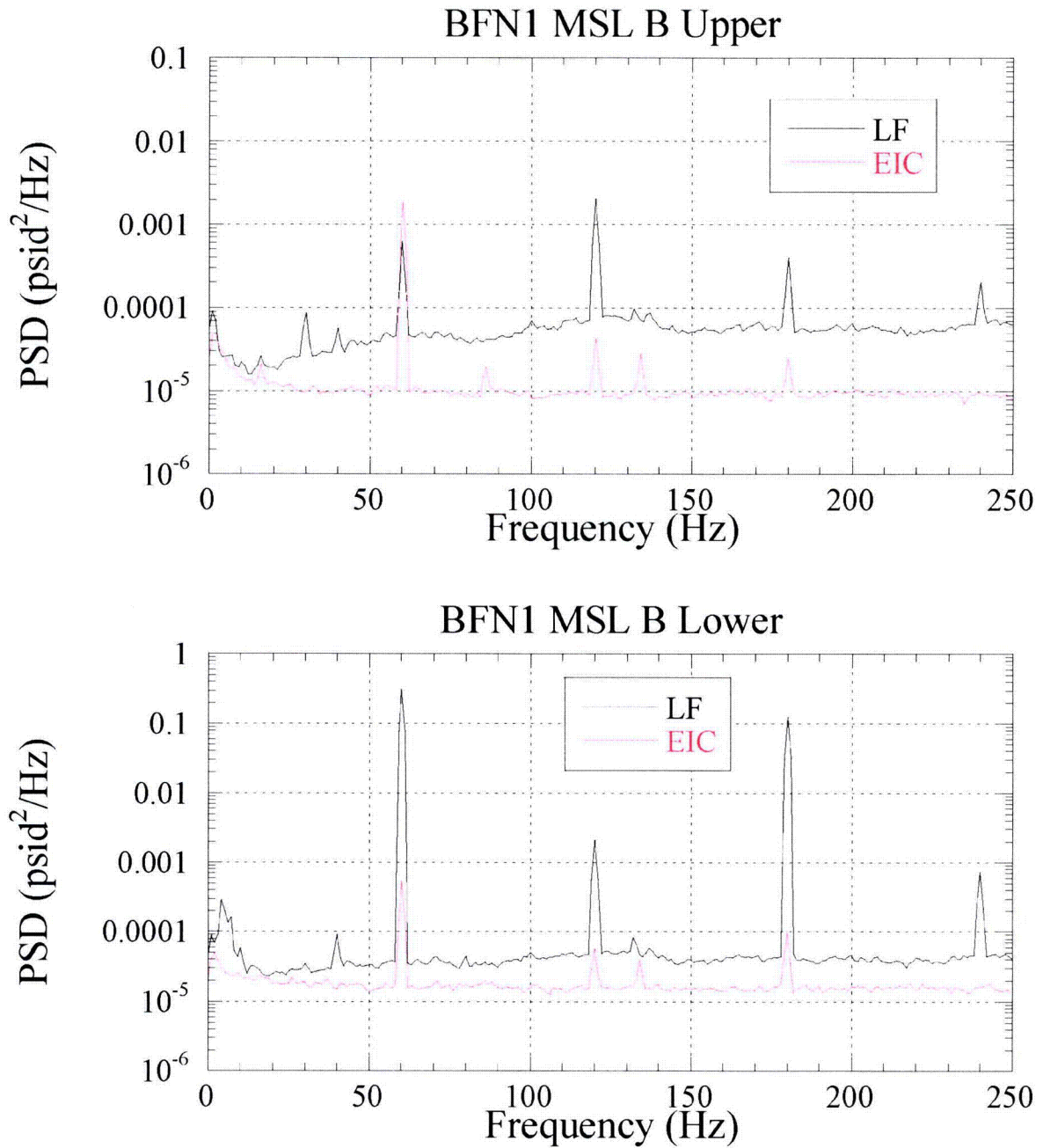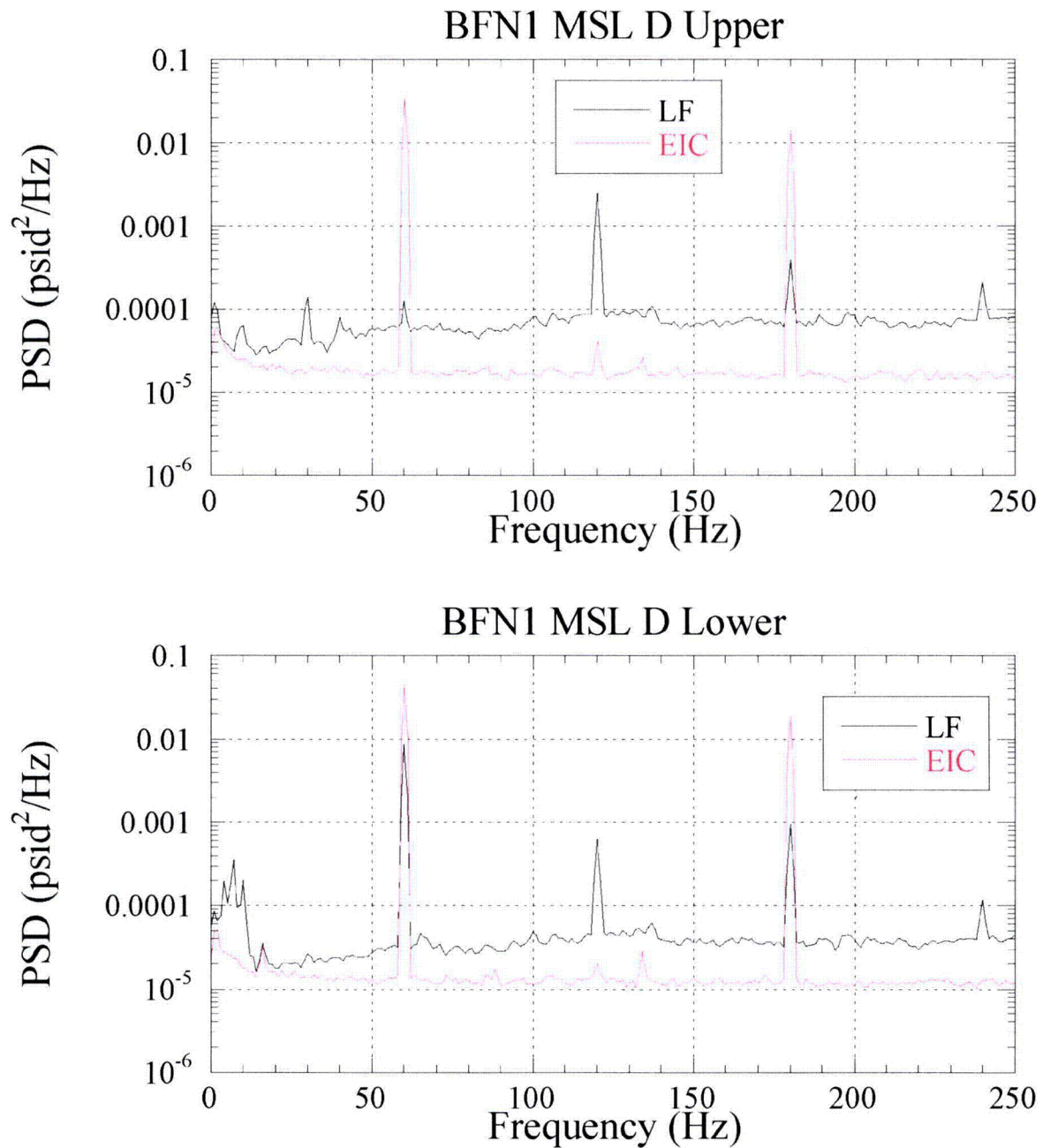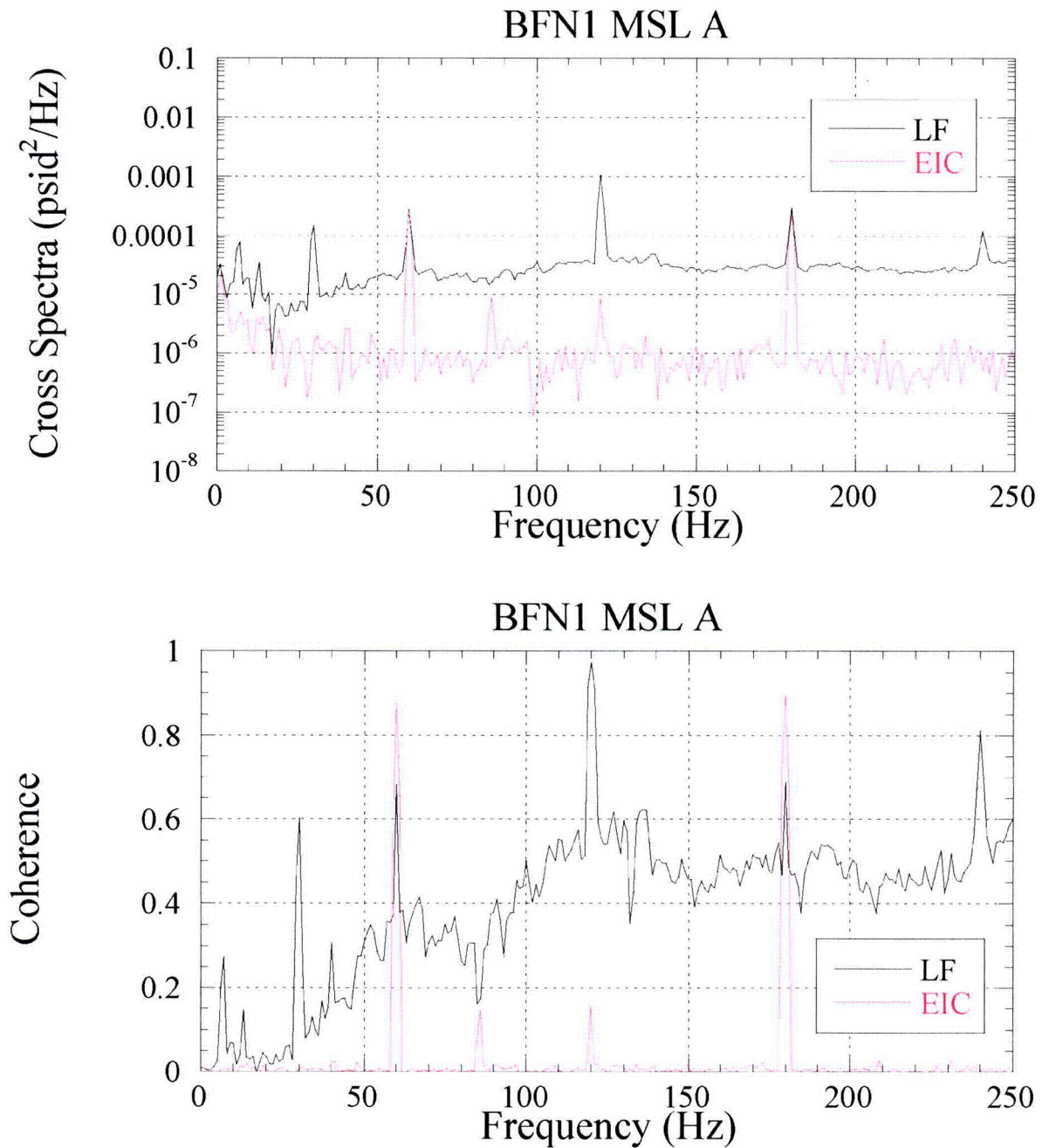
Figure EMCB.203-1.5b: Autospectra of measured data for BFN1 main steam line B: upper strain gage location (top), lower strain gage location (bottom), for LF conditions (black) and corresponding EIC (red).

## BFN1 MSL C Upper



## BFN1 MSL C Lower
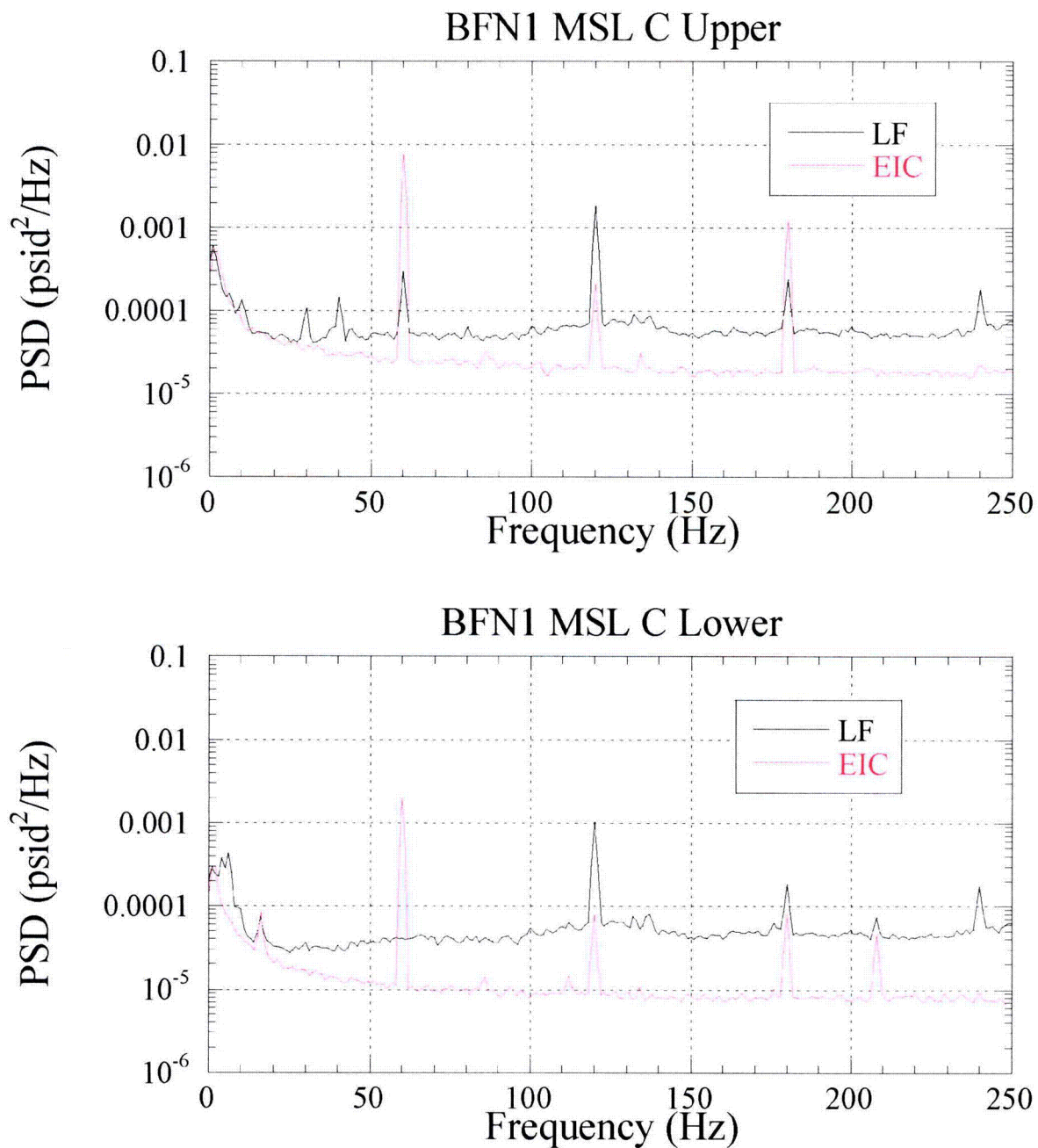


Figure EMCB.203-1.5c: Autospectra of measured data for BFN1 main steam line C: upper strain gage location (top), lower strain gage location (bottom), for LF conditions (black) and corresponding EIC (red).

## BFN1 MSL D Upper



## BFN1 MSL D Lower



Figure EMCB.203-1.5d: Autospectra of measured data for BFN1 main steam line D: upper strain gage location (top), lower strain gage location (bottom), for LF conditions (black) and corresponding EIC (red).
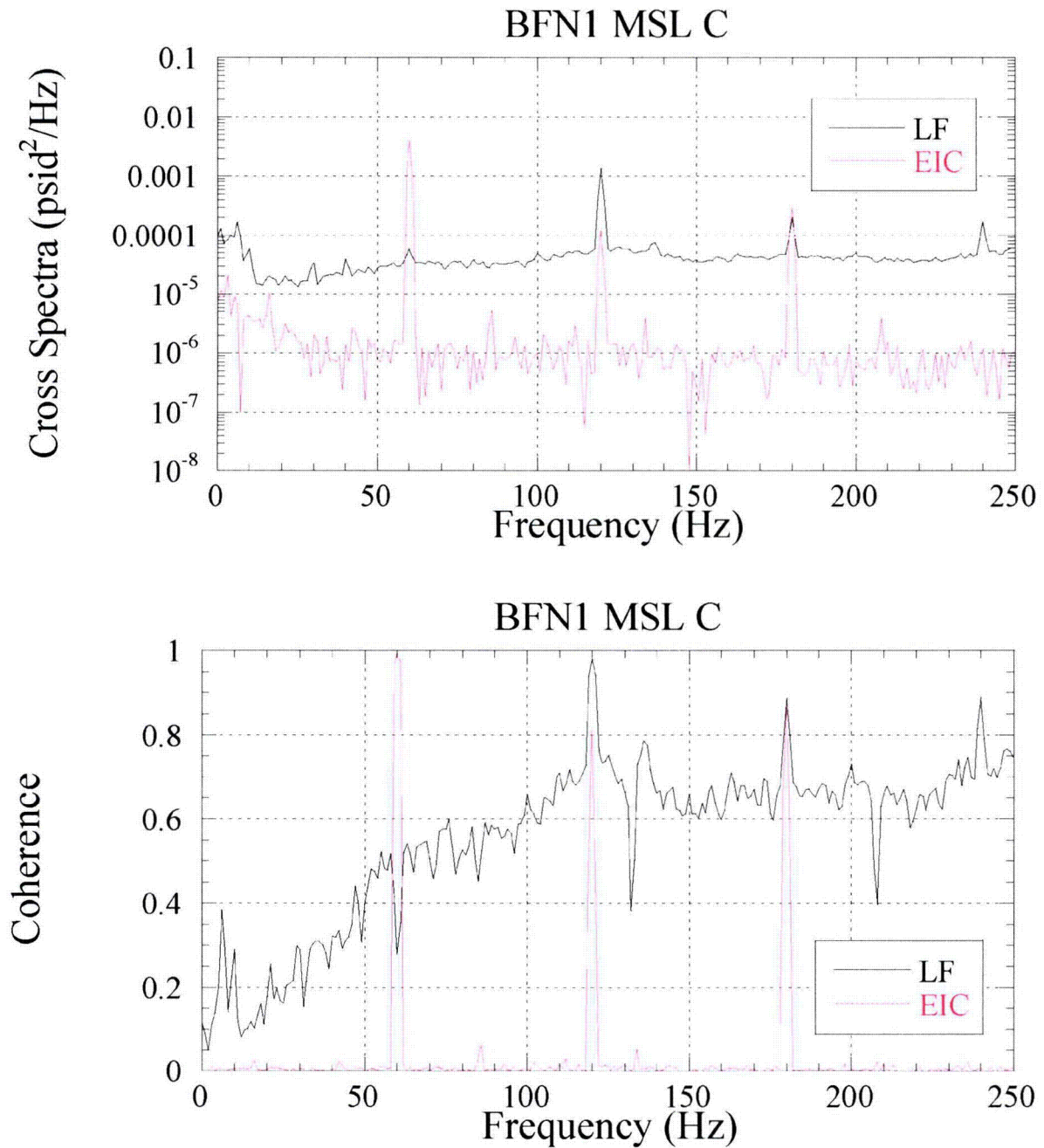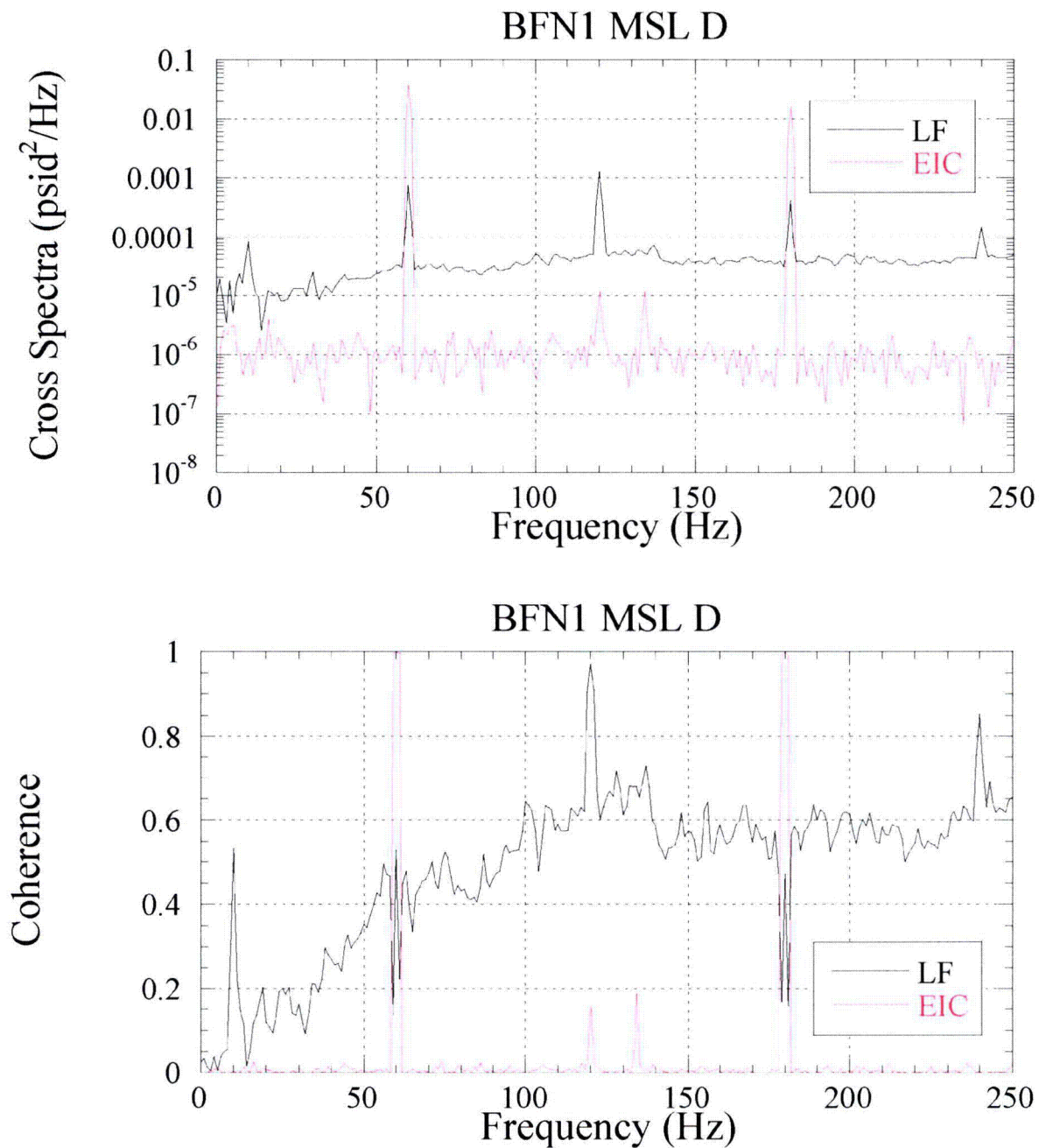
Figure EMCB.203-1.6a: Cross spectra (top) and coherence (bottom) of measured data for BFN1 main steam line A, for LF conditions (black) and corresponding EIC (red).
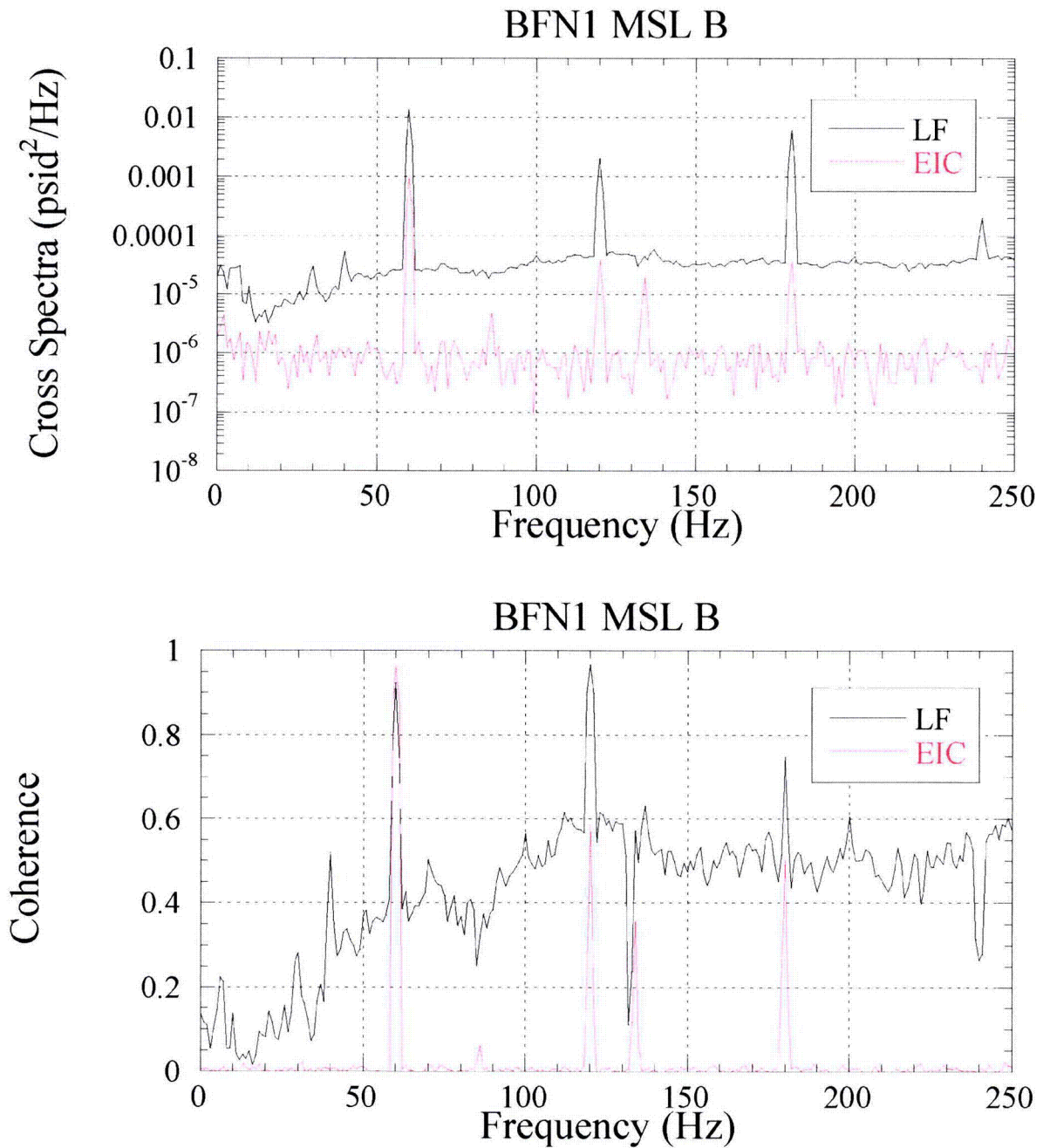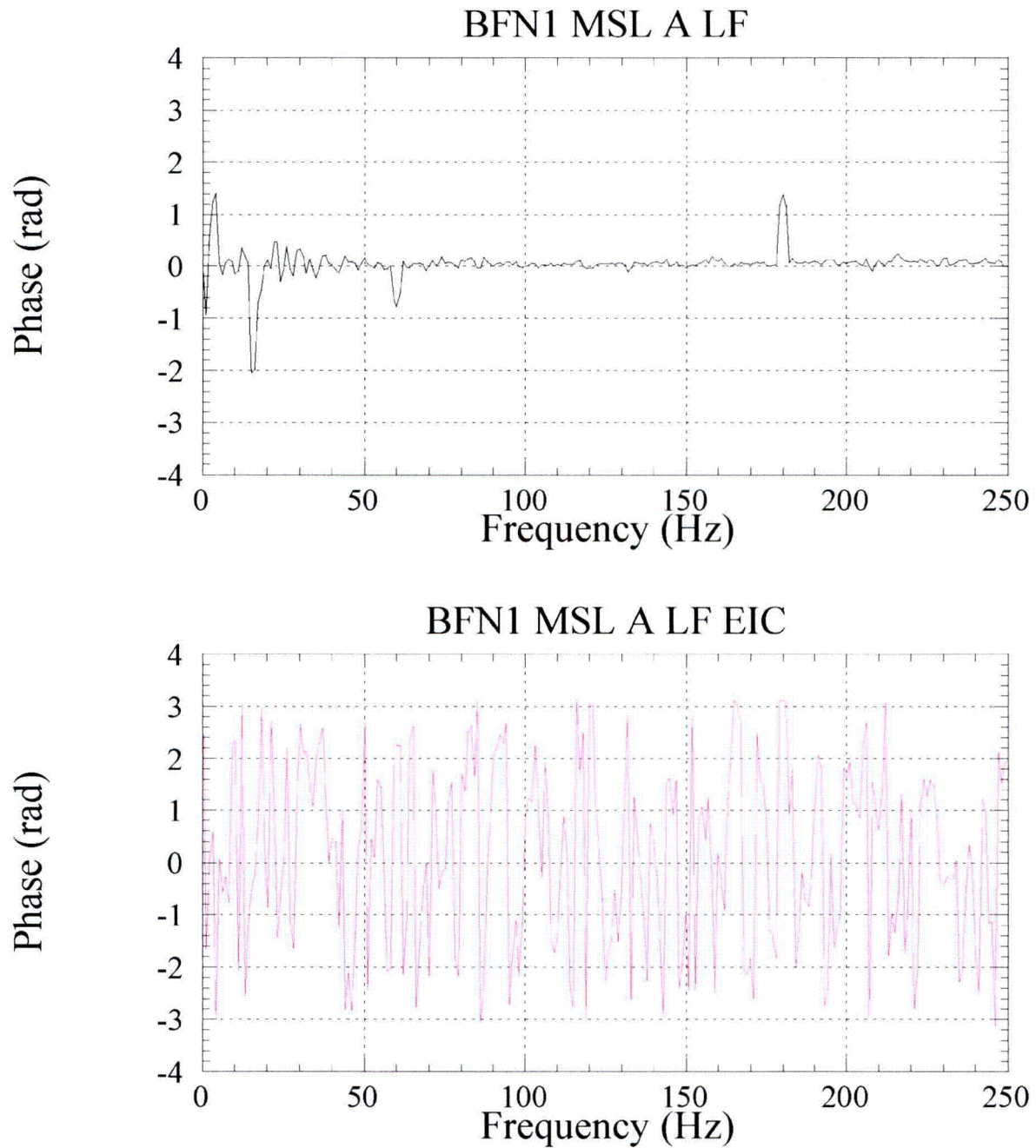
Figure EMCB.203-1.6b: Cross spectra (top) and coherence (bottom) of measured data for BFN1 main steam line B, for LF conditions (black) and corresponding EIC (red).

Figure EMCB.203-1.6c: Cross spectra (top) and coherence (bottom) of measured data for BFN1 main steam line C, for LF conditions (black) and corresponding EIC (red).

## BFN1 MSL D



## BFN1 MSL D



Figure EMCB.203-1.6d: Cross spectra (top) and coherence (bottom) of measured data for BFN1 main steam line D, for LF conditions (black) and corresponding EIC (red).
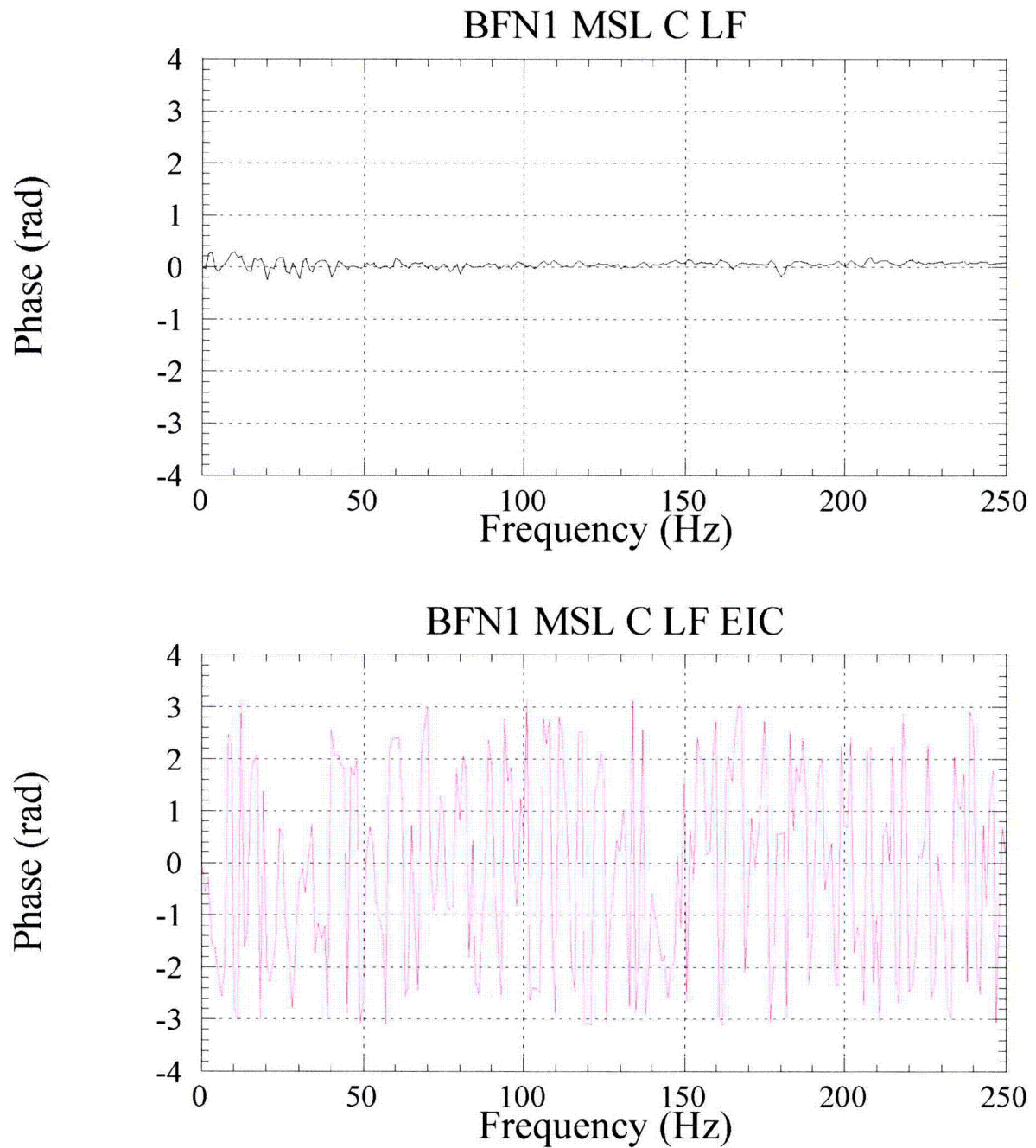
Figure EMCB.203-1.7a: Phase of measured data for BFN1 main steam line A, for LF conditions (black, top) and corresponding EIC (red, bottom).
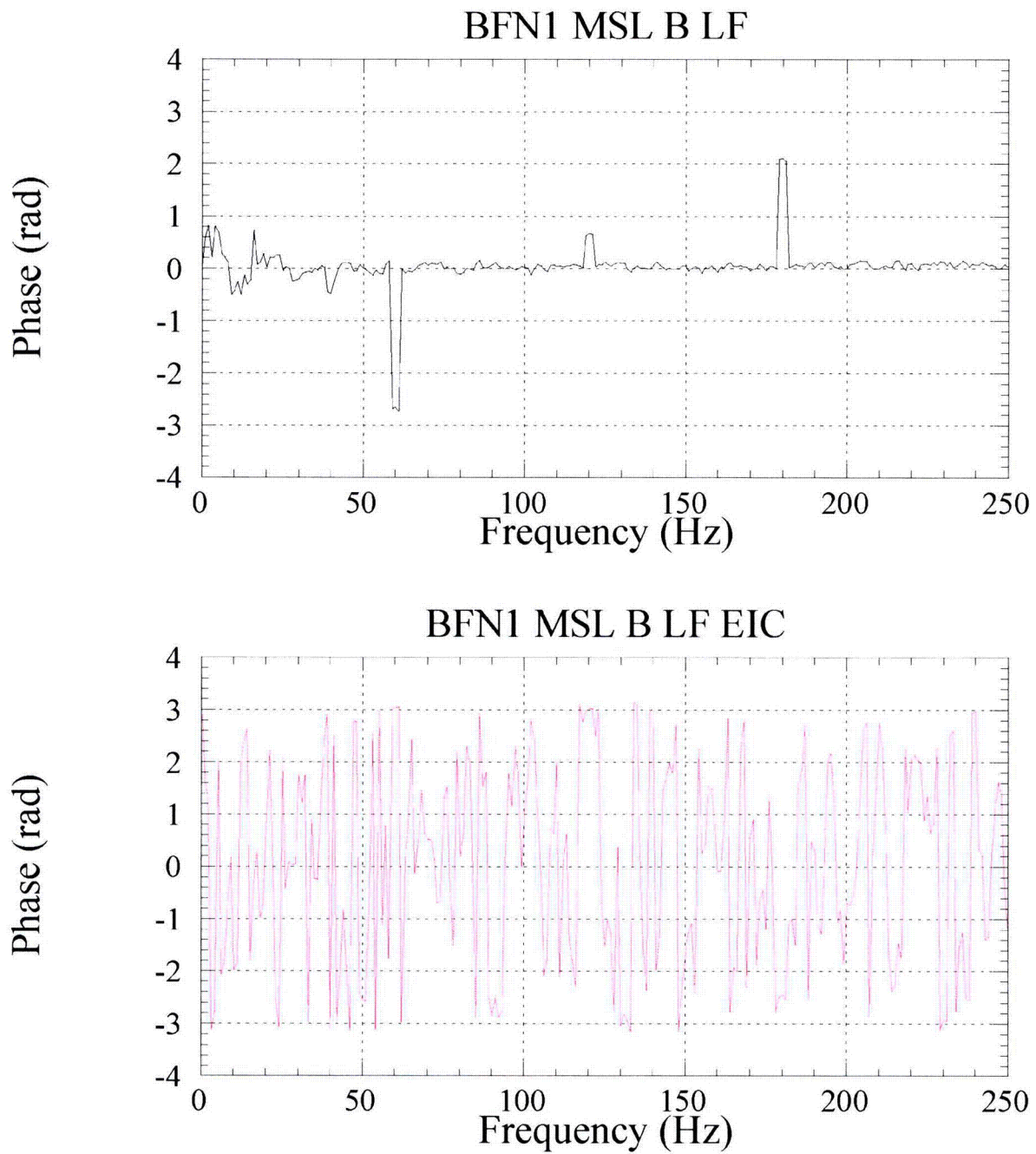
Figure EMCB.203-1.7b: Phase of measured data for BFN1 main steam line B, for LF conditions (black, top) and corresponding EIC (red, bottom).

Figure EMCB.203-1.7c: Phase of measured data for BFN1 main steam line C, for LF conditions (black, top) and corresponding EIC (red, bottom).
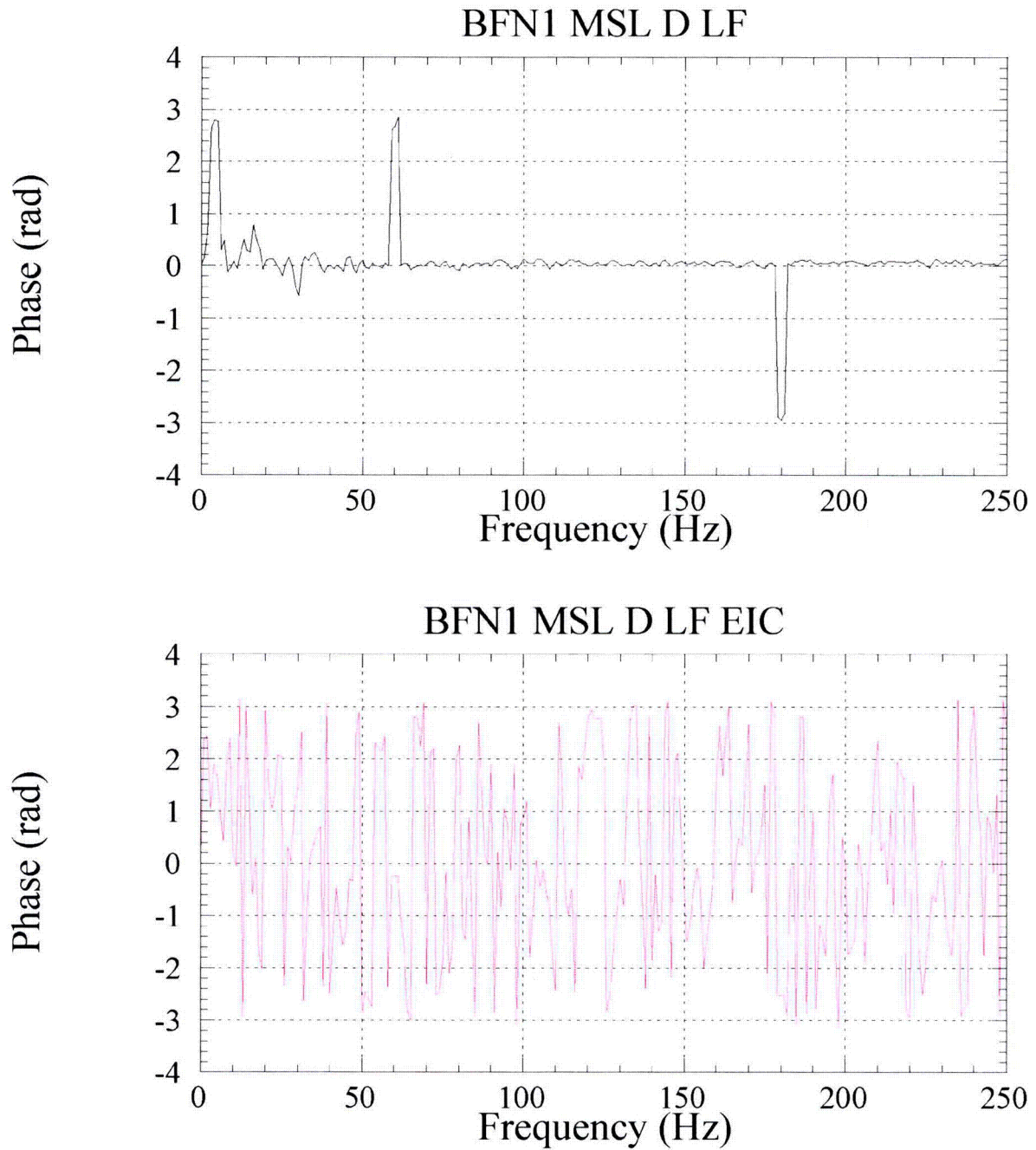
Figure EMCB.203-1.7d: Phase of measured data for BFN1 main steam line D, for LF conditions (black, top) and corresponding EIC (red, bottom).

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**After Step 1: remove EIC**

| Figure EMCB.203- | Contents |
|---|---|
| 1.9a | PSD of main steam line A upper and lower for CLTP and LF |
| 1.9b | PSD of main steam line B upper and lower for CLTP and LF |
| 1.9c | PSD of main steam line C upper and lower for CLTP and LF |
| 1.9d | PSD of main steam line D upper and lower for CLTP and LF |
| 1.10a | Cross spectra and coherence of main steam line A for CLTP and LF |
| 1.10b | Cross spectra and coherence of main steam line B for CLTP and LF |
| 1.10c | Cross spectra and coherence of main steam line C for CLTP and LF |
| 1.10d | Cross spectra and coherence of main steam line D for CLTP and LF |
| 1.11a | Phase of main steam lines A and B for CLTP and LF |
| 1.11b | Phase of main steam lines C and D for CLTP and LF |
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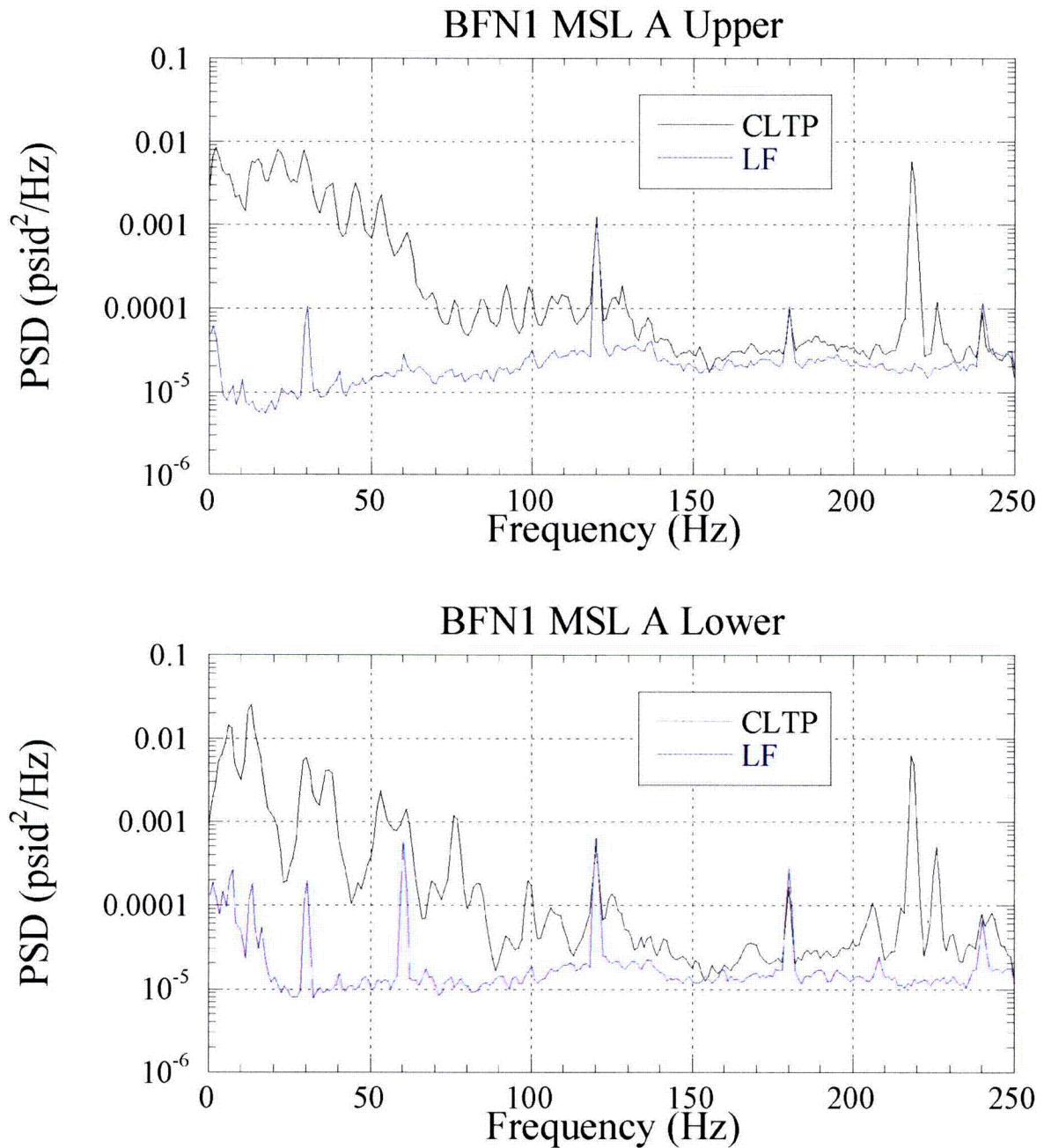## BFN1 MSL A Upper



## BFN1 MSL A Lower



Figure EMCB.203-1.9a: Autospectra of EIC removed data for BFN1 main steam line A: upper strain gage location (top), lower strain gage location (bottom), for CLTP conditions (black) and LF conditions (blue).
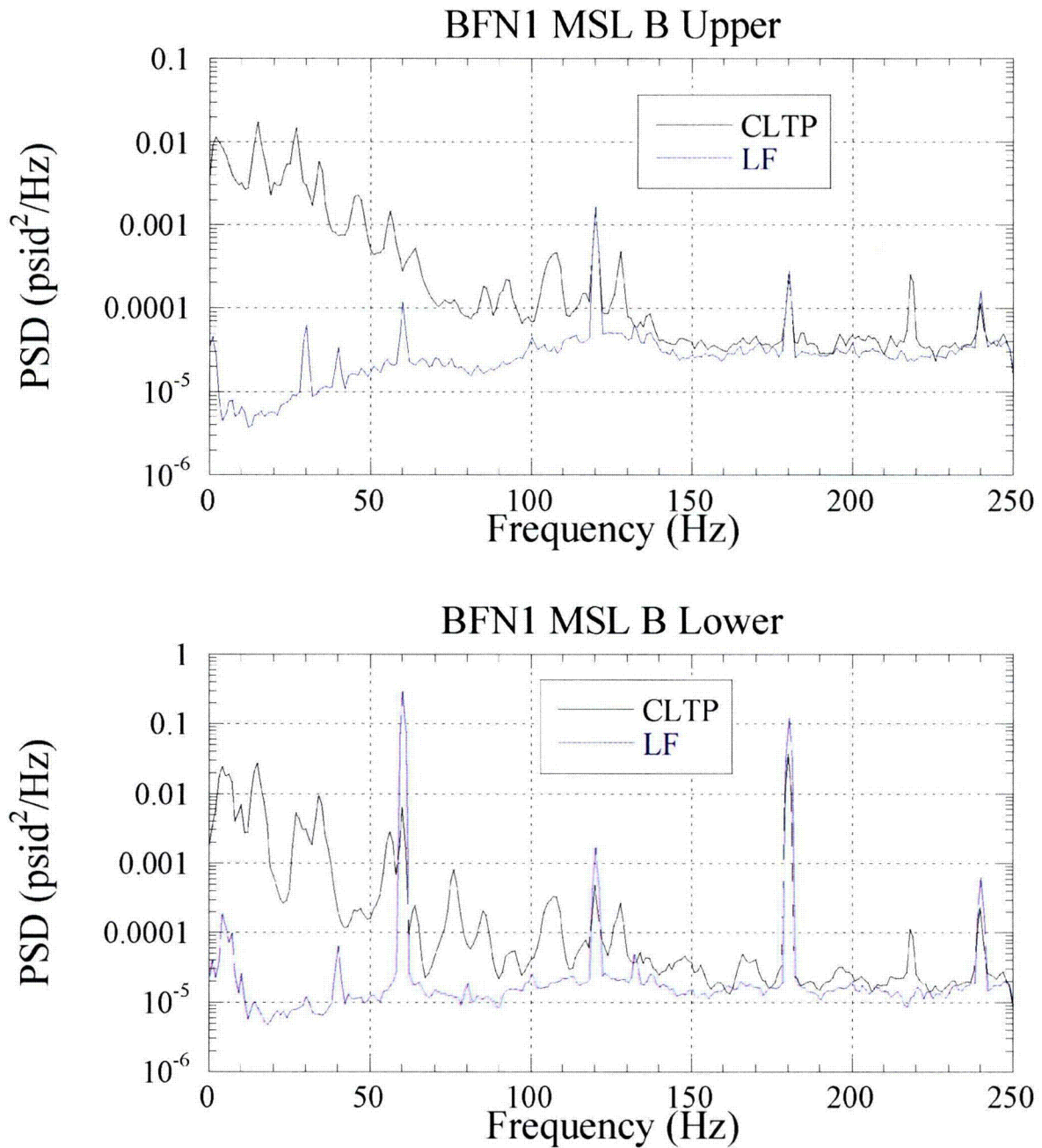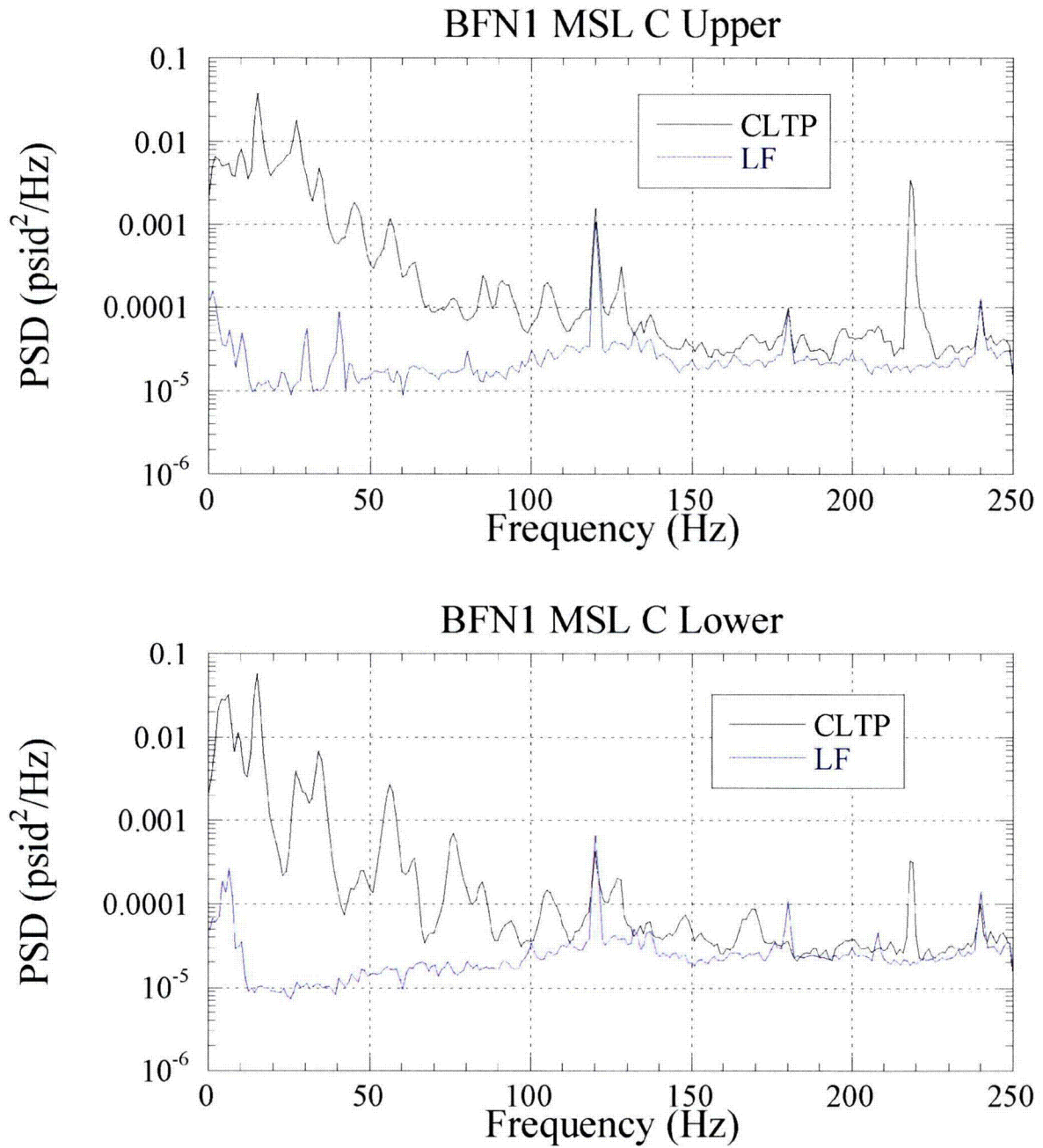
## BFN1 MSL B Upper



## BFN1 MSL B Lower



Figure EMCB.203-1.9b: Autospectra of EIC removed data for BFN1 main steam line B: upper strain gage location (top), lower strain gage location (bottom), for CLTP conditions (black) and LF conditions (blue).
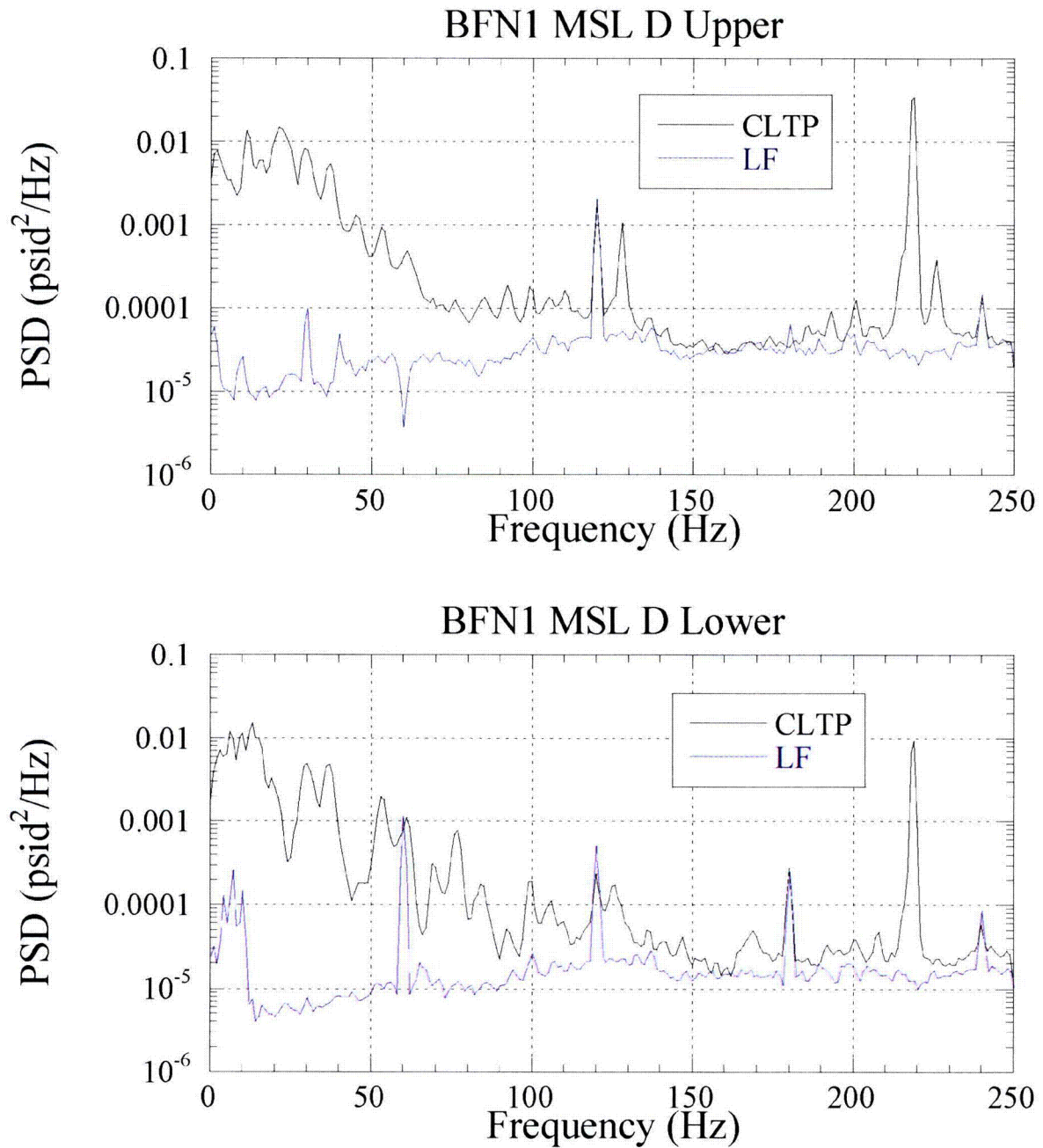
## BFN1 MSL C Upper



## BFN1 MSL C Lower



Figure EMCB.203-1.9c: Autospectra of EIC removed data for BFN1 main steam line C: upper strain gage location (top), lower strain gage location (bottom), for CLTP conditions (black) and LF conditions (blue).
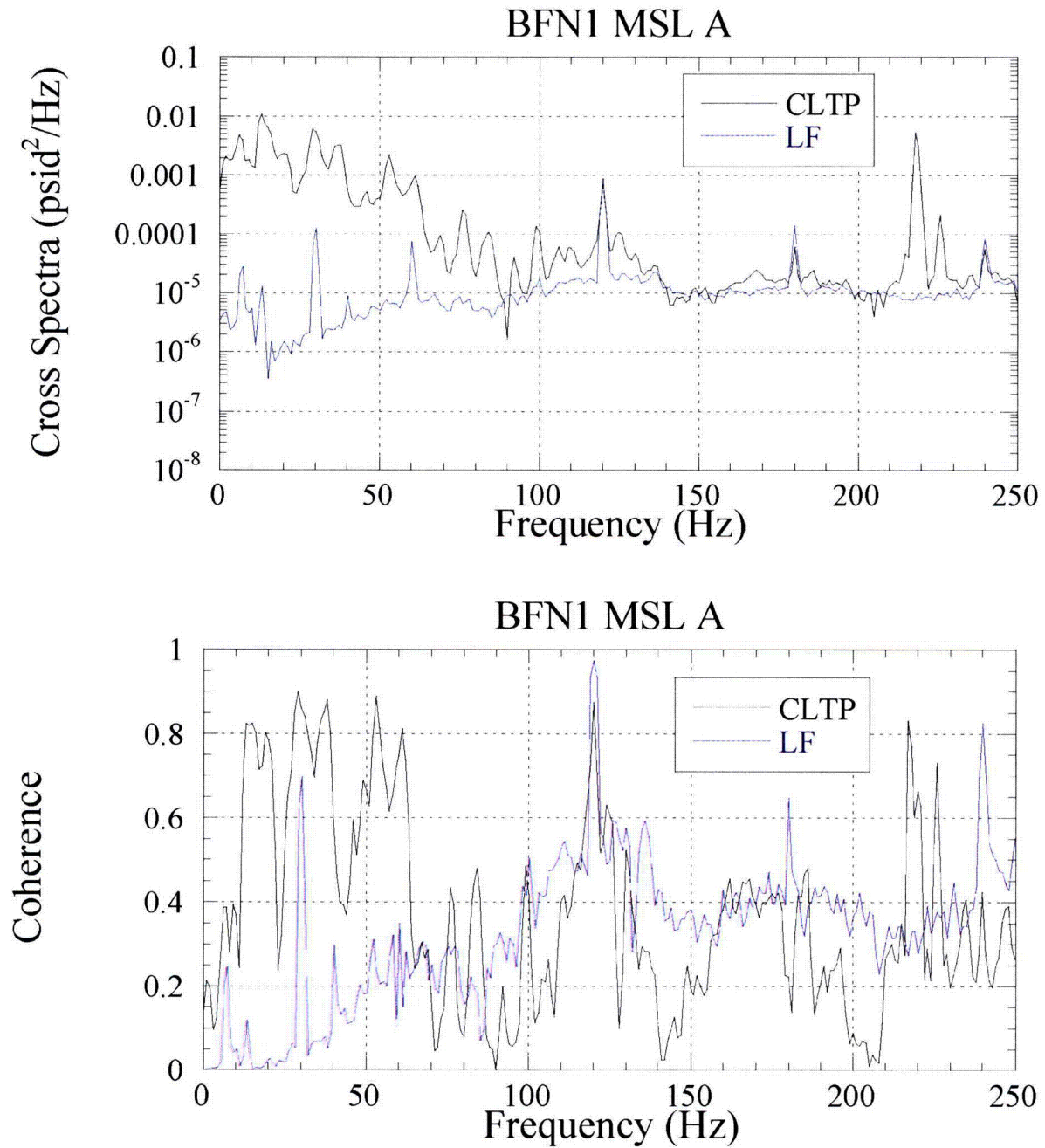
## BFN1 MSL D Upper



## BFN1 MSL D Lower



Figure EMCB.203-1.9d: Autospectra of EIC removed data for BFN1 main steam line D: upper strain gage location (top), lower strain gage location (bottom), for CLTP conditions (black) and LF conditions (blue).

Figure EMCB.203-1.10a: Cross spectra (top) and coherence (bottom) of EIC removed data for BFN1 main steam line A, for CLTP conditions (black) and LF conditions (blue).
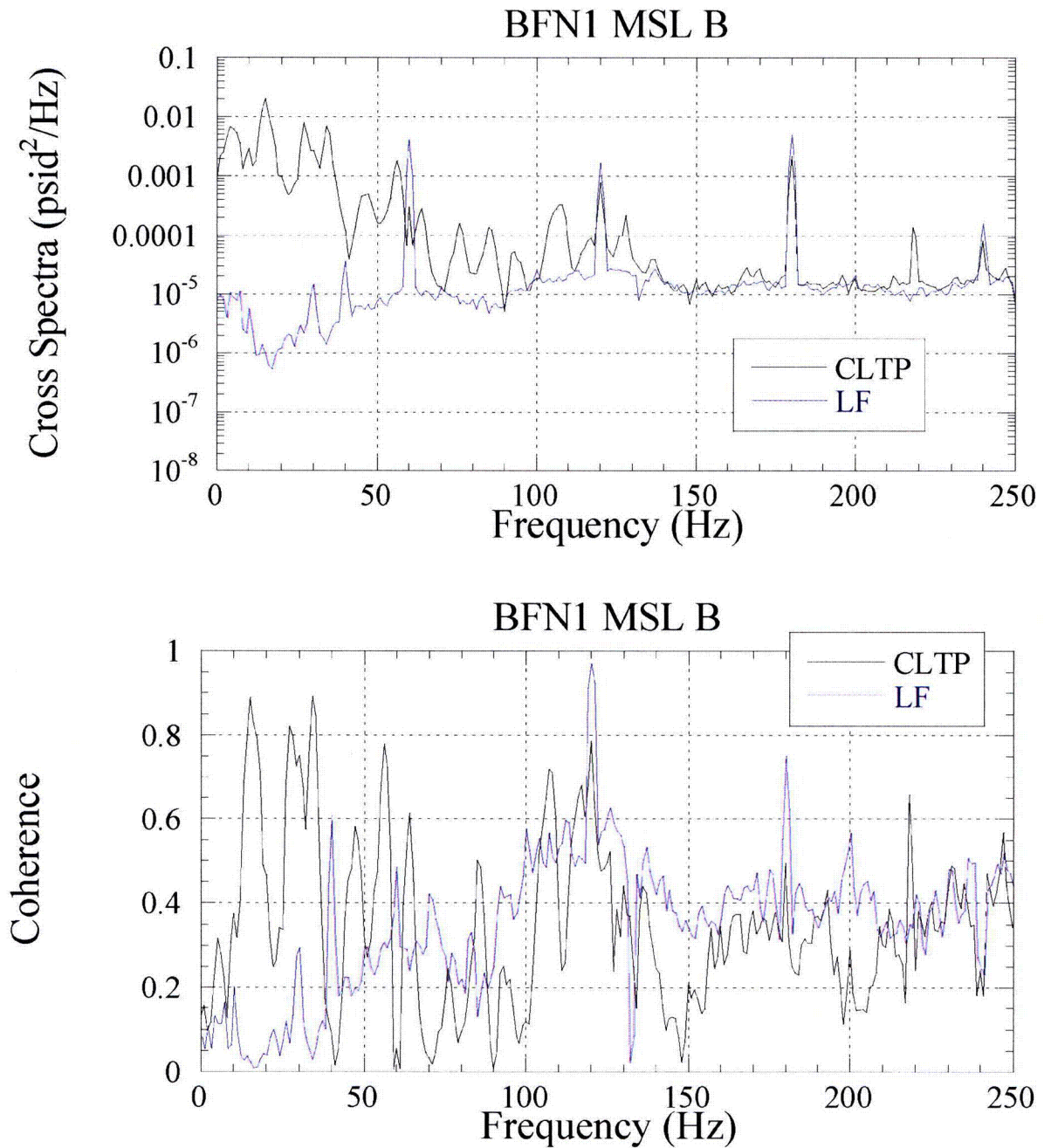
Figure EMCB.203-1.10b: Cross spectra (top) and coherence (bottom) of EIC removed data for BFN1 main steam line B, for CLTP conditions (black) and LF conditions (blue).
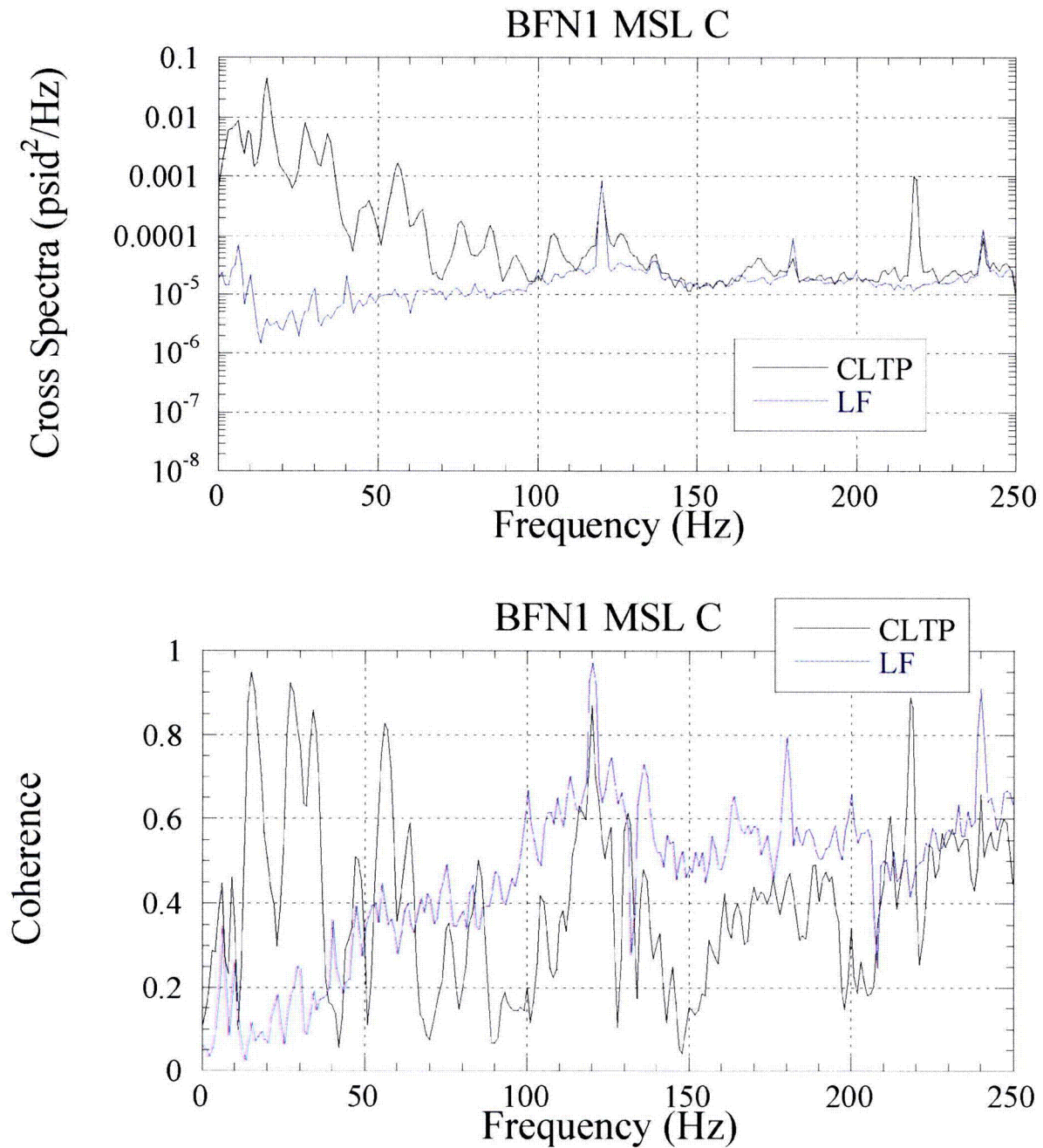
Figure EMCB.203-1.10c: Cross spectra (top) and coherence (bottom) of EIC removed data for BFN1 main steam line C, for CLTP conditions (black) and LF conditions (blue).
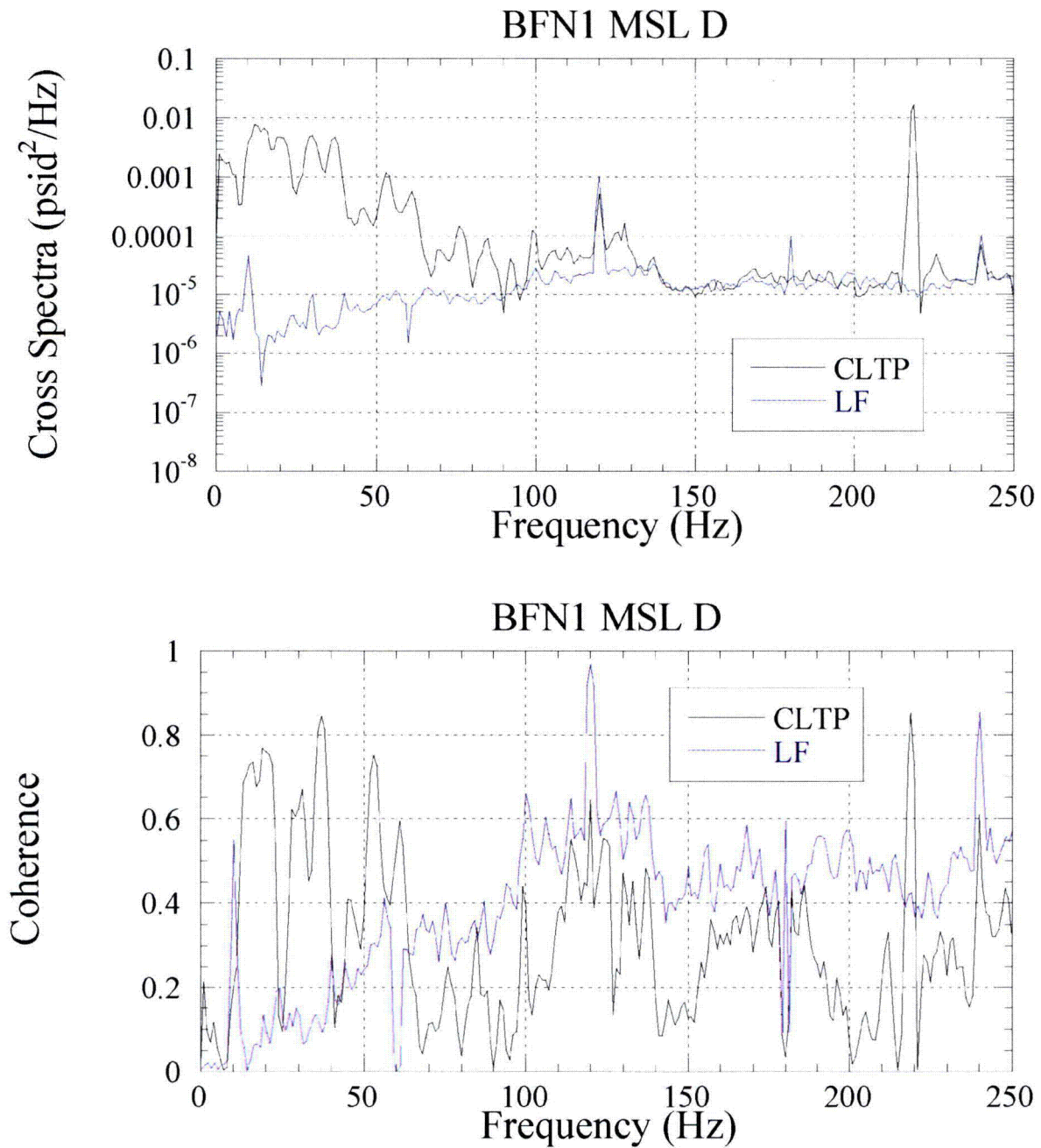
Figure EMCB.203-1.10d: Cross spectra (top) and coherence (bottom) of EIC removed data for BFN1 main steam line D, for CLTP conditions (black) and LF conditions (blue).
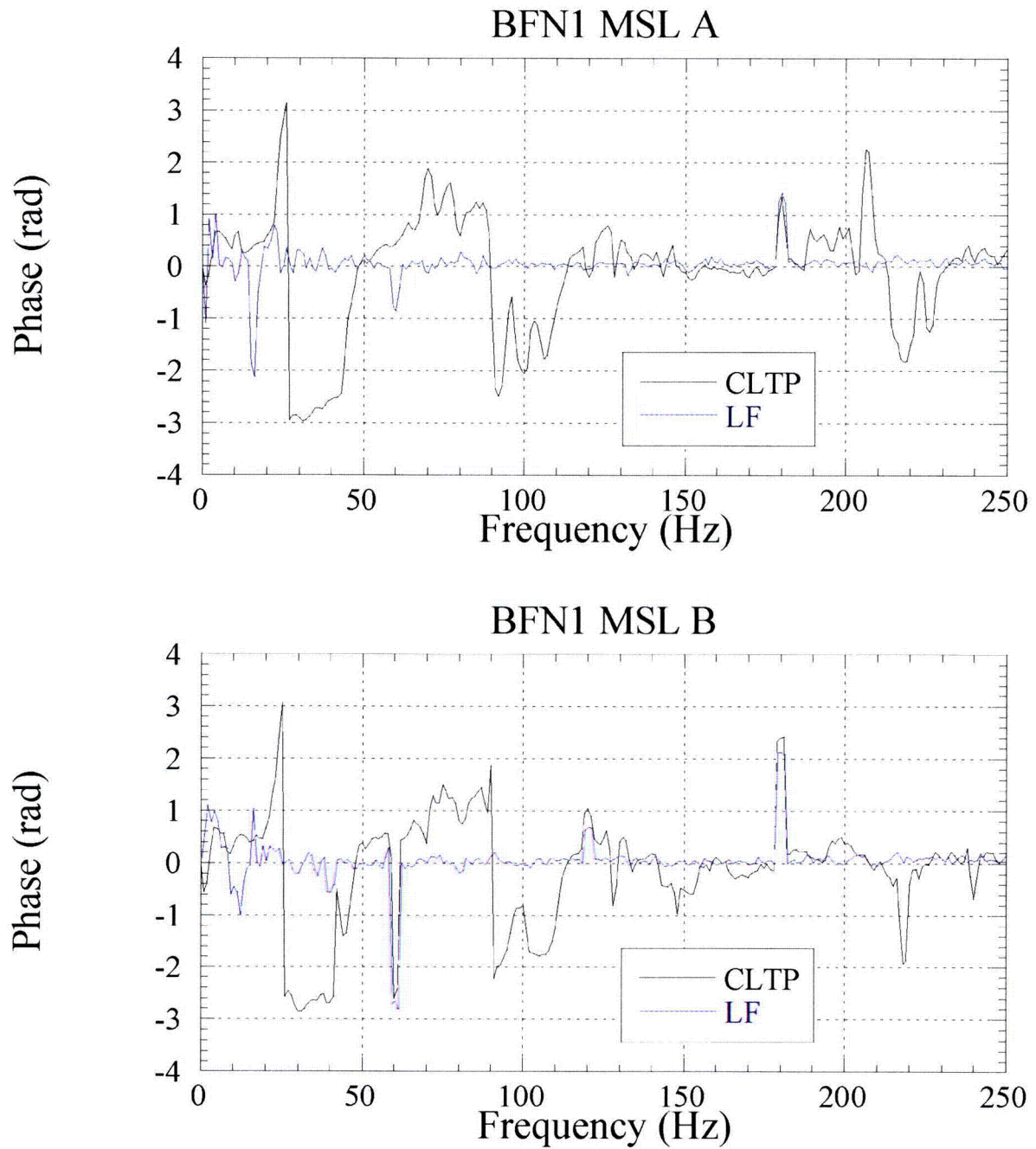
## BFN1 MSL A



## BFN1 MSL B



Figure EMCB.203-1.11a: Phase of EIC removed data for BFN1 main steam line A (top) and B (bottom), for CLTP conditions (black) and LF conditions (blue).
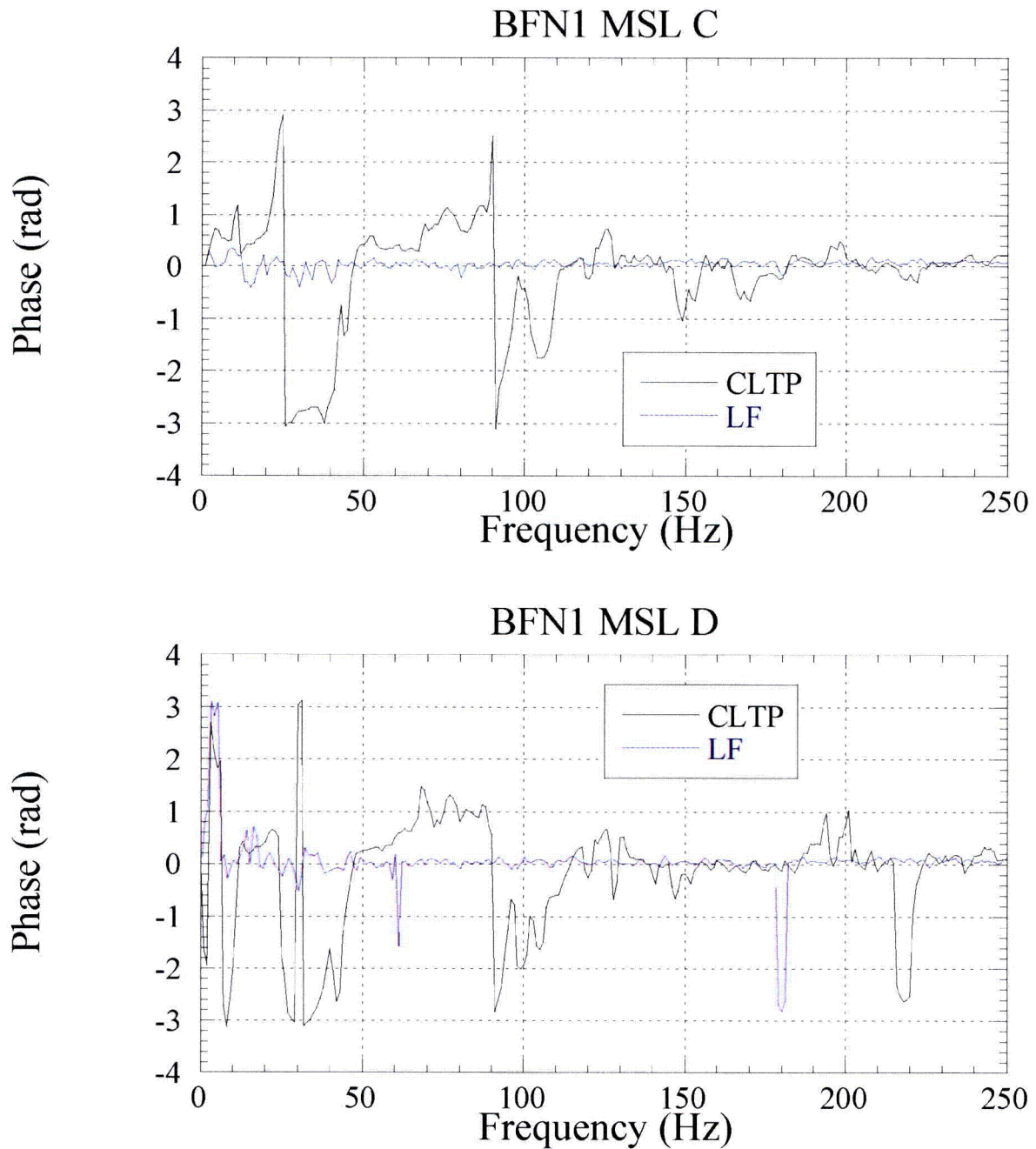
Figure EMCB.203-1.11b: Phase of EIC removed data for BFN1 main steam line C (top) and D (bottom), for CLTP conditions (black) and LF conditions (blue).

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## After Step 2: apply notch filters

| Figure EMCB.203- | Contents |
|---|---|
| 1.13a | PSD of main steam line A upper and lower for CLTP and LF |
| 1.13b | PSD of main steam line B upper and lower for CLTP and LF |
| 1.13c | PSD of main steam line C upper and lower for CLTP and LF |
| 1.13d | PSD of main steam line D upper and lower for CLTP and LF |
| 1.14a | Cross spectra and coherence of main steam line A for CLTP and LF |
| 1.14b | Cross spectra and coherence of main steam line B for CLTP and LF |
| 1.14c | Cross spectra and coherence of main steam line C for CLTP and LF |
| 1.14d | Cross spectra and coherence of main steam line D for CLTP and LF |
| 1.15a | Phase of main steam lines A and B for CLTP and LF |
| 1.15b | Phase of main steam lines C and D for CLTP and LF |
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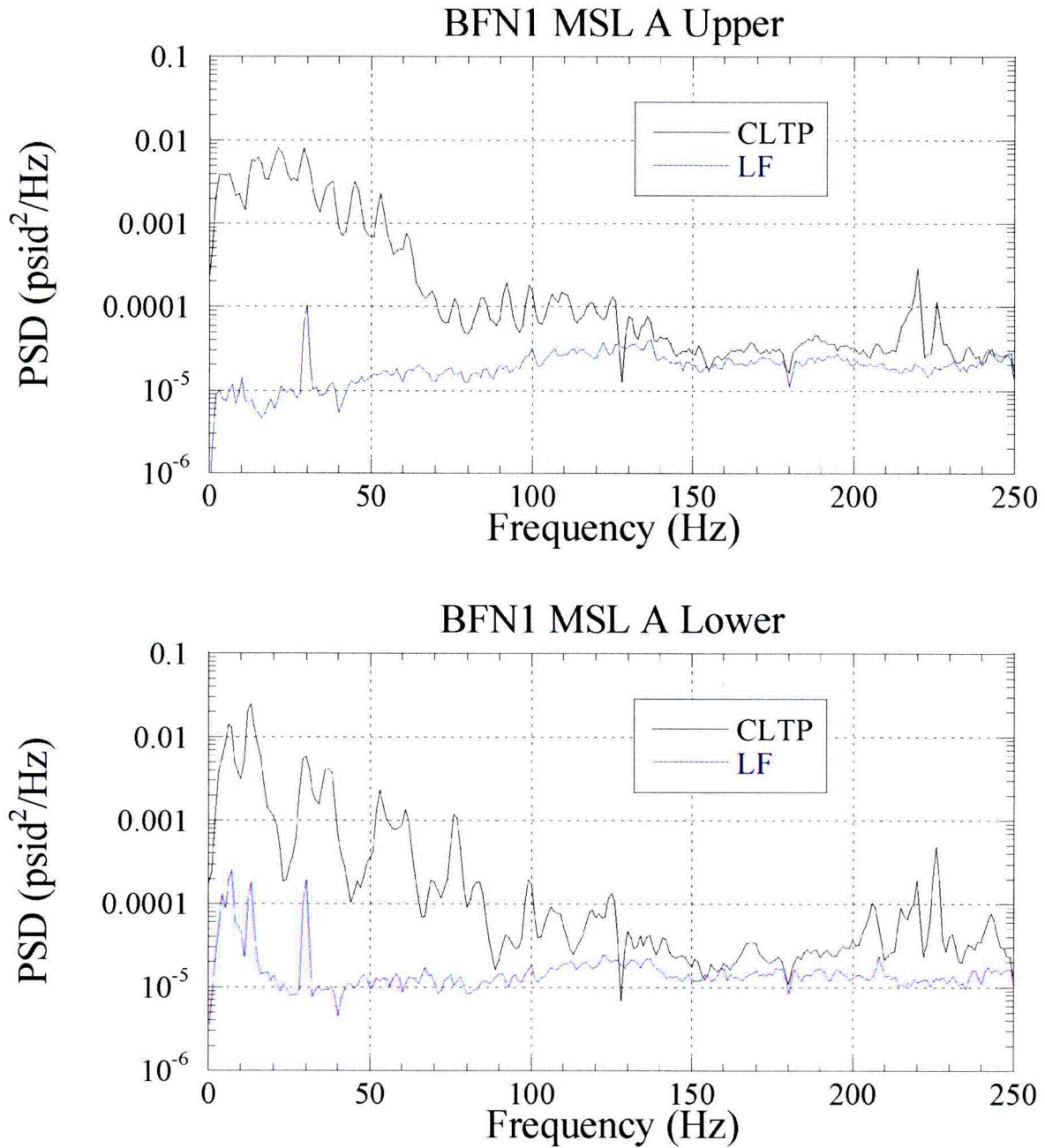
Figure EMCB.203-1.13a: Autospectra of notch filtered data for BFN1 main steam line A: upper strain gage location (top), lower strain gage location (bottom), for CLTP conditions (black) and LF conditions (blue).
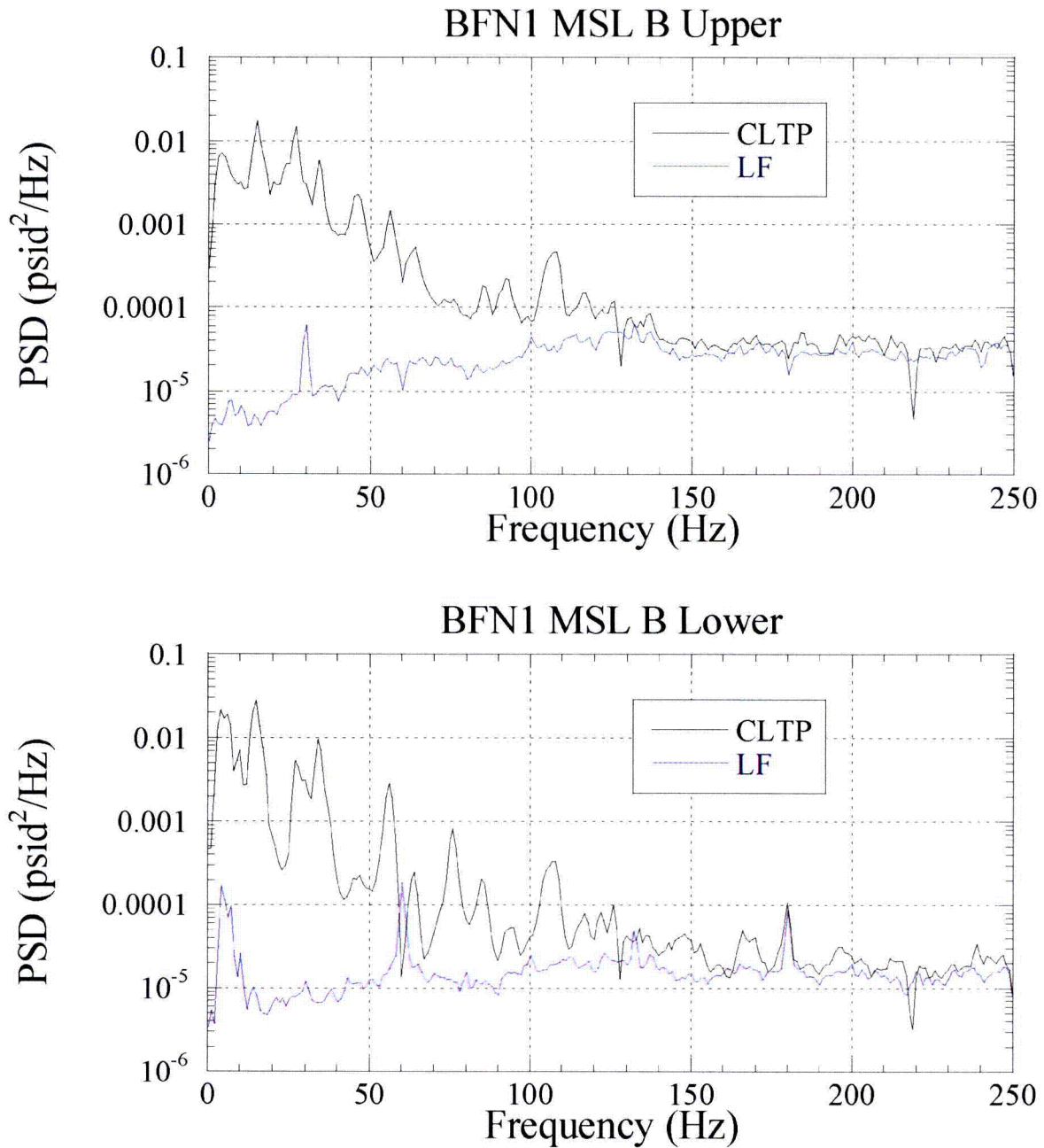
## BFN1 MSL B Upper



## BFN1 MSL B Lower



Figure EMCB.203-1.13b: Autospectra of notch filtered data for BFN1 main steam line B: upper strain gage location (top), lower strain gage location (bottom), for CLTP conditions (black) and LF conditions (blue).
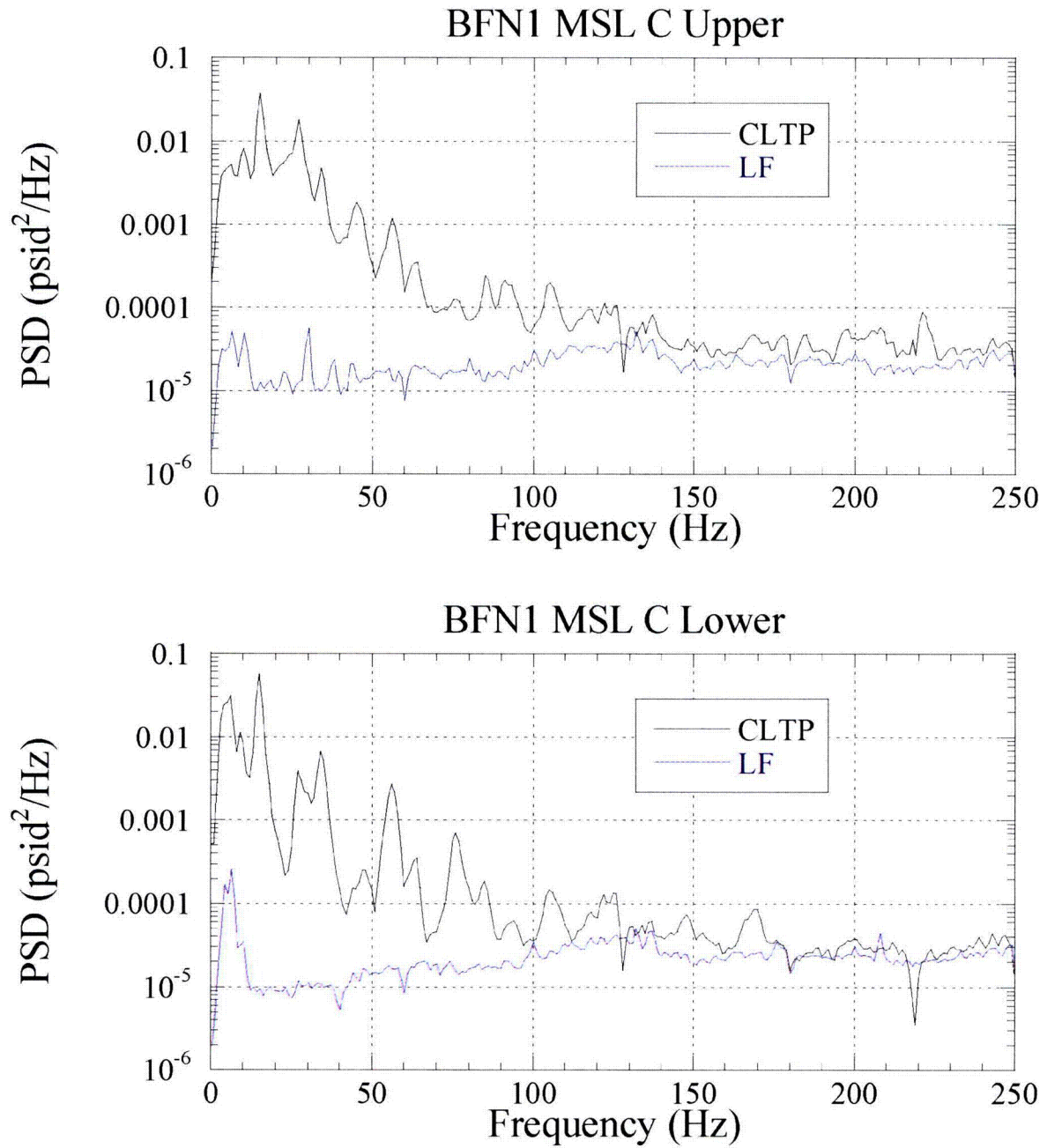
## BFN1 MSL C Upper



## BFN1 MSL C Lower



Figure EMCB.203-1.13c: Autospectra of notch filtered data for BFN1 main steam line C: upper strain gage location (top), lower strain gage location (bottom), for CLTP conditions (black) and LF conditions (blue).
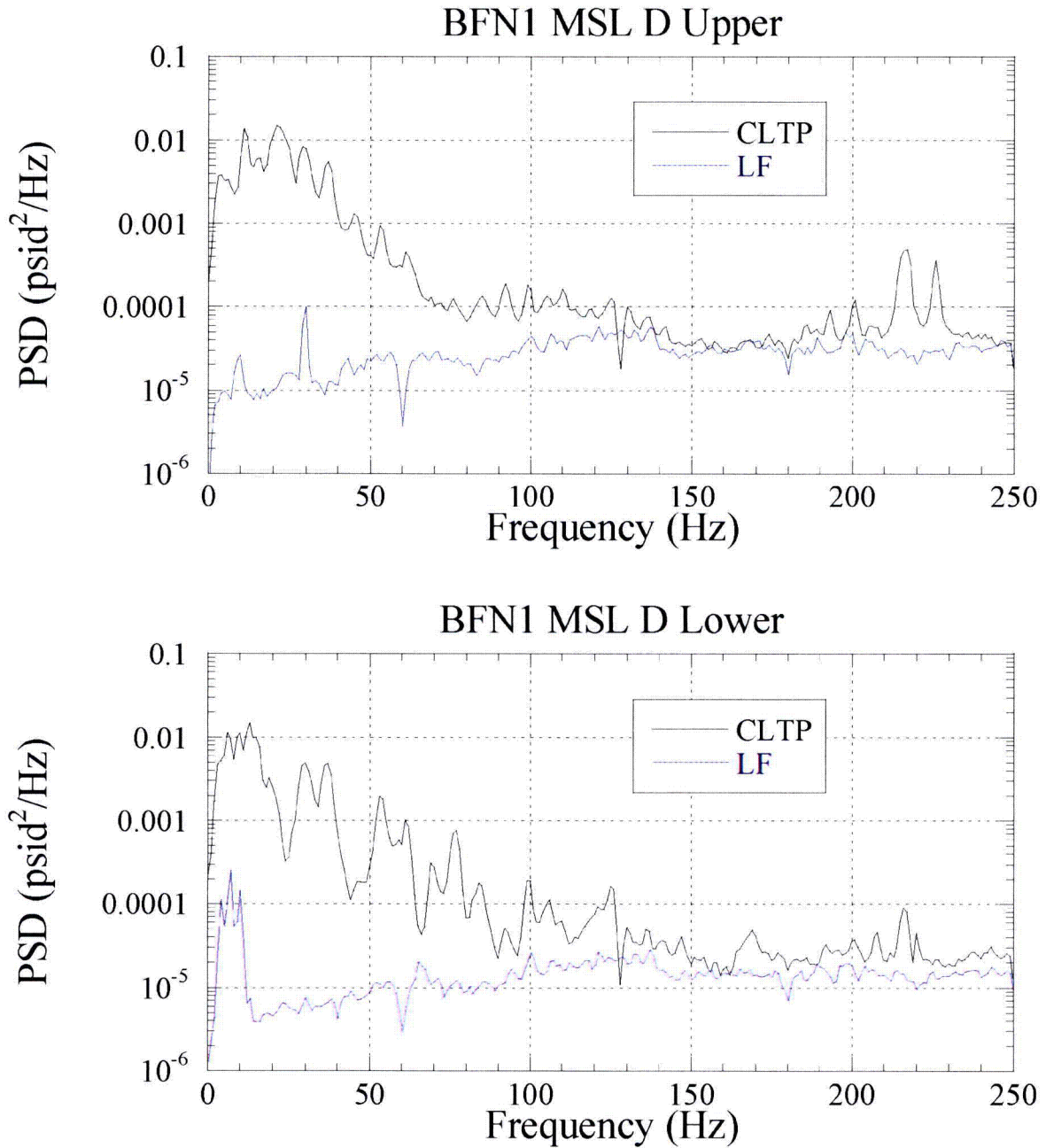
Figure EMCB.203-1.13d: Autospectra of notch filtered data for BFN1 main steam line D: upper strain gage location (top), lower strain gage location (bottom), for CLTP conditions (black) and LF conditions (blue).
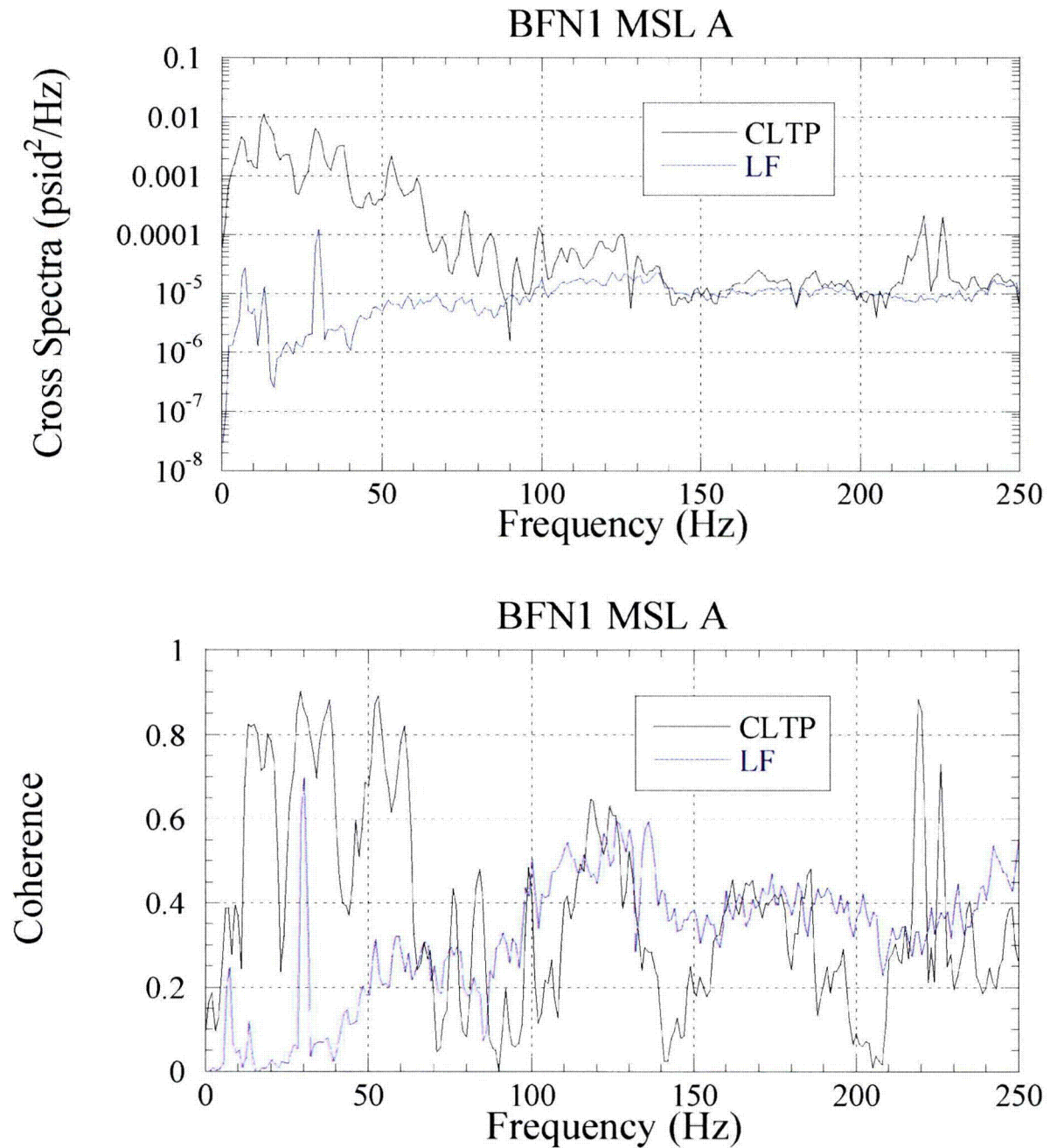
## BFN1 MSL A



## BFN1 MSL A



Figure EMCB.203-1.14a: Cross spectra (top) and coherence (bottom) of notch filtered data for BFN1 main steam line A, for CLTP conditions (black) and LF conditions (blue).
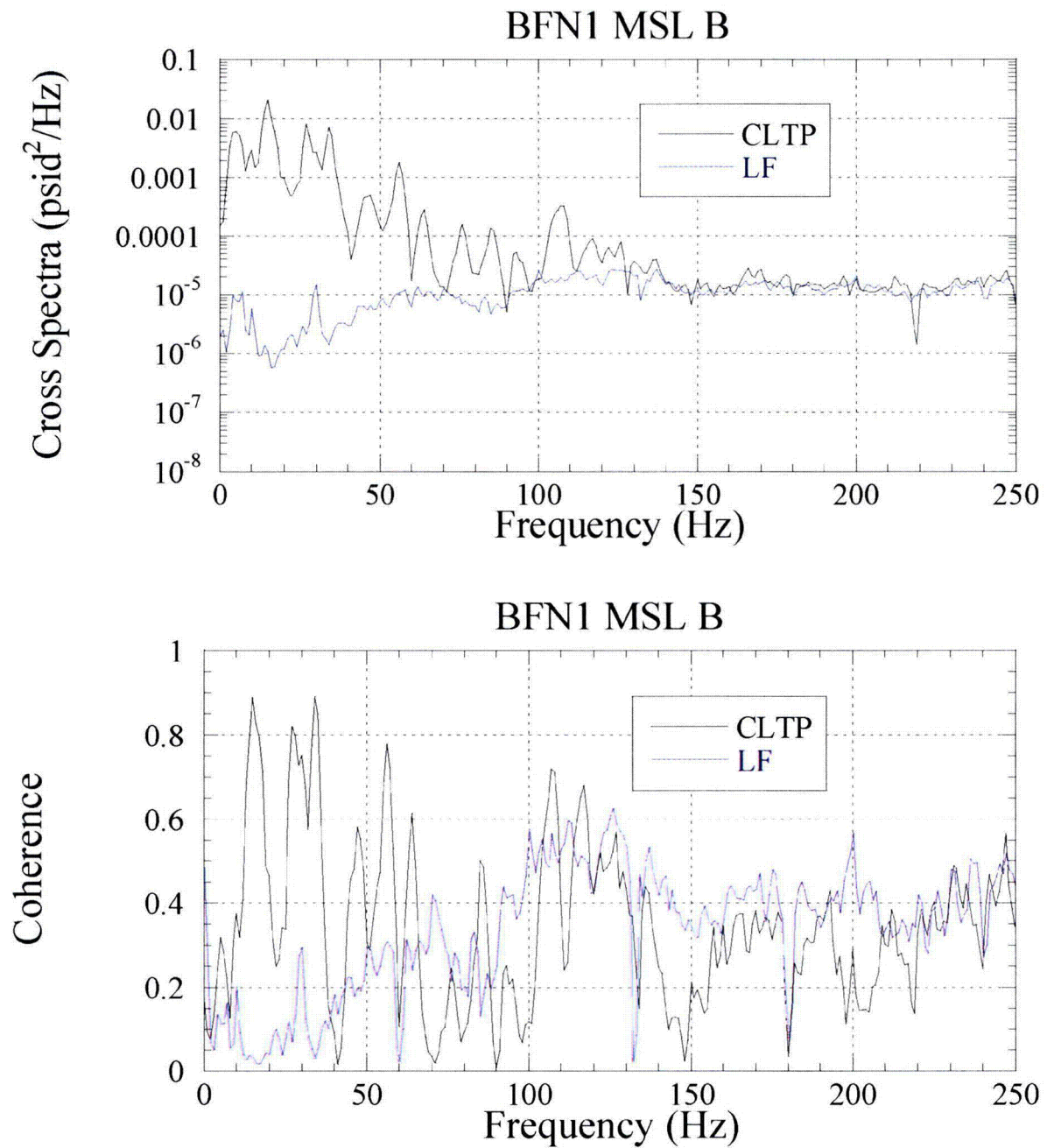
## BFN1 MSL B



## BFN1 MSL B



Figure EMCB.203-1.14b: Cross spectra (top) and coherence (bottom) of notch filtered data for BFN1 main steam line B, for CLTP conditions (black) and LF conditions (blue).
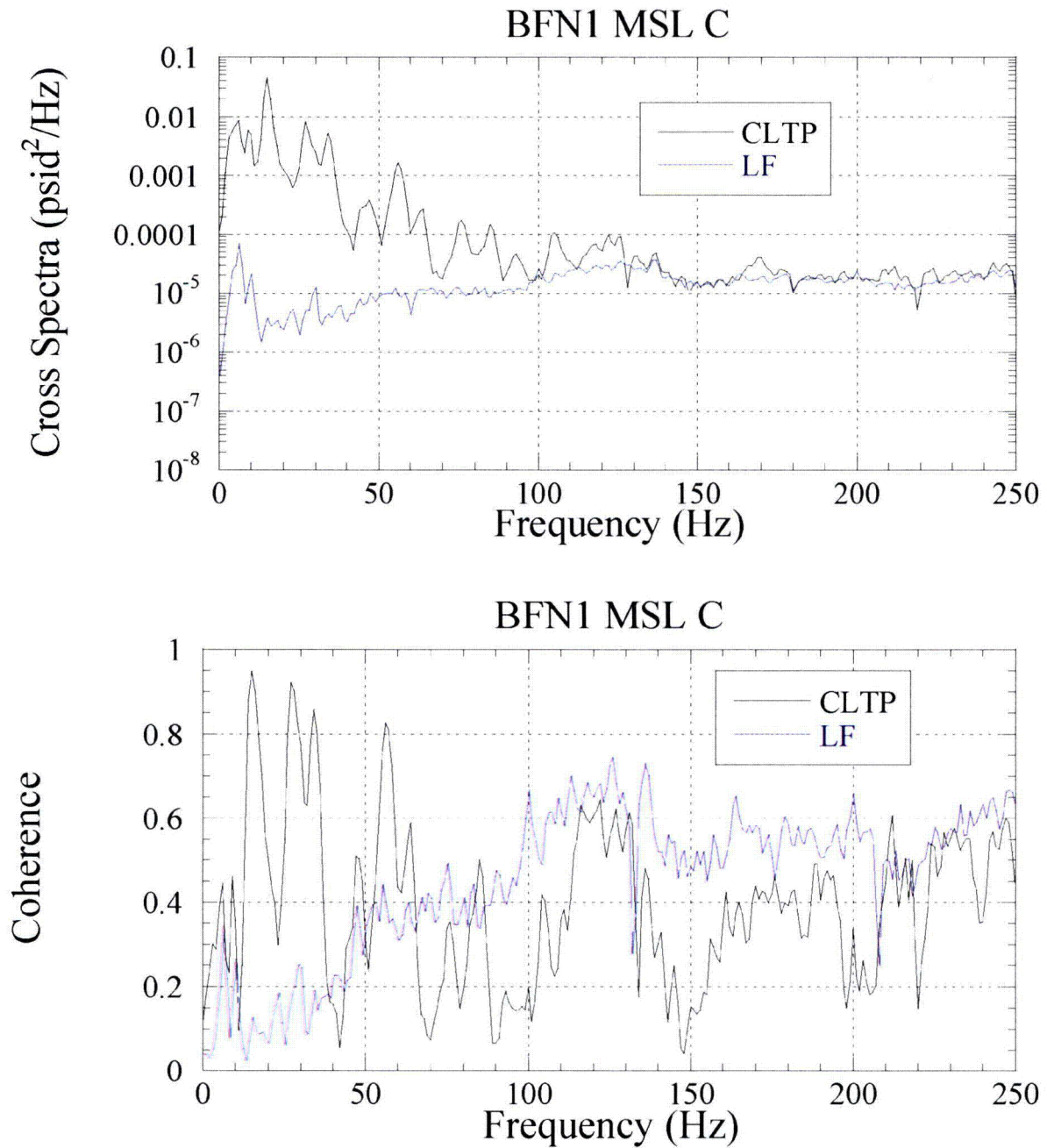
## BFN1 MSL C



## BFN1 MSL C



Figure EMCB.203-1.14c: Cross spectra (top) and coherence (bottom) of notch filtered data for BFN1 main steam line C, for CLTP conditions (black) and LF conditions (blue).
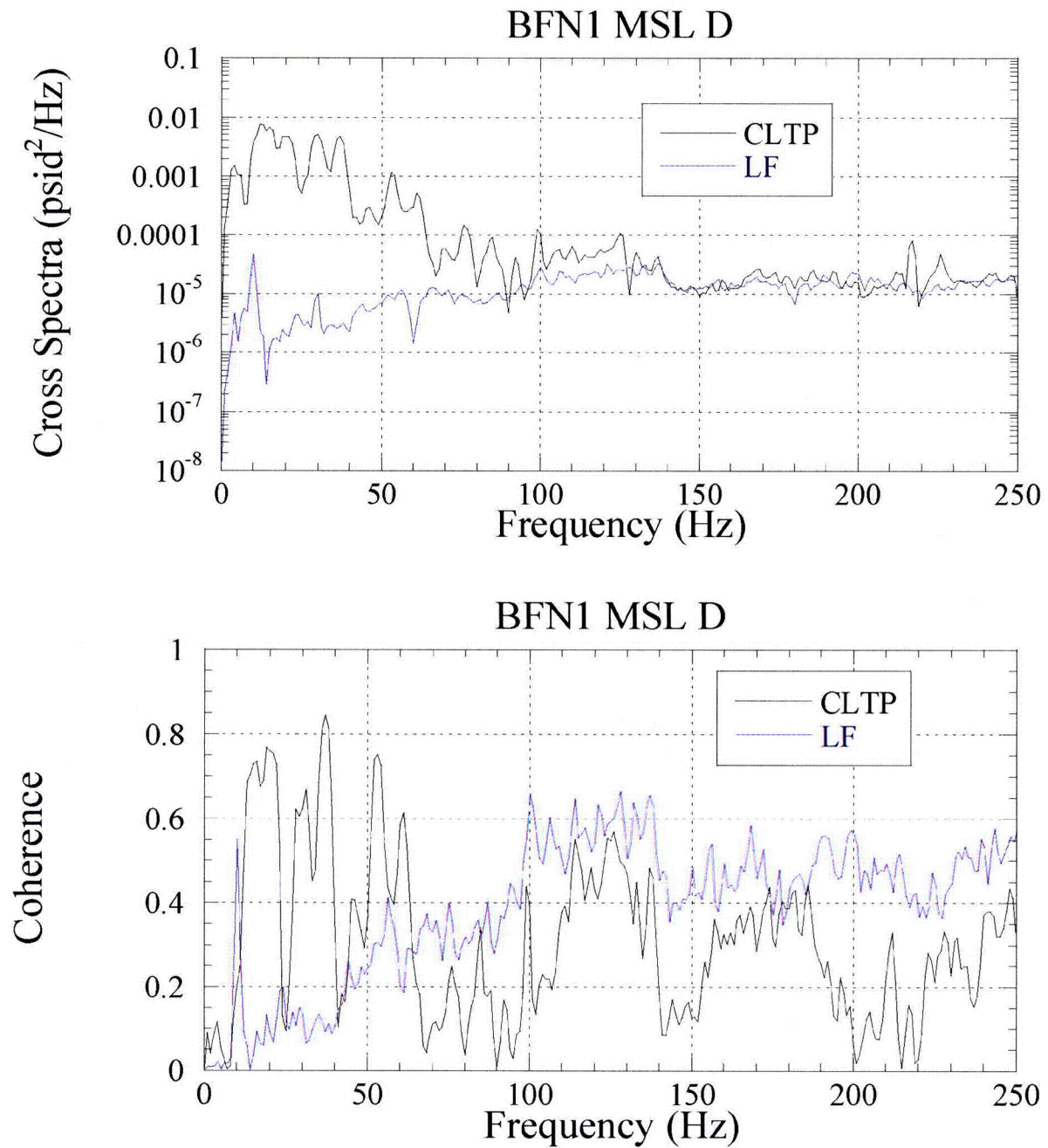
Figure EMCB.203-1.14d: Cross spectra (top) and coherence (bottom) of notch filtered data for BFN1 main steam line D, for CLTP conditions (black) and LF conditions (blue).
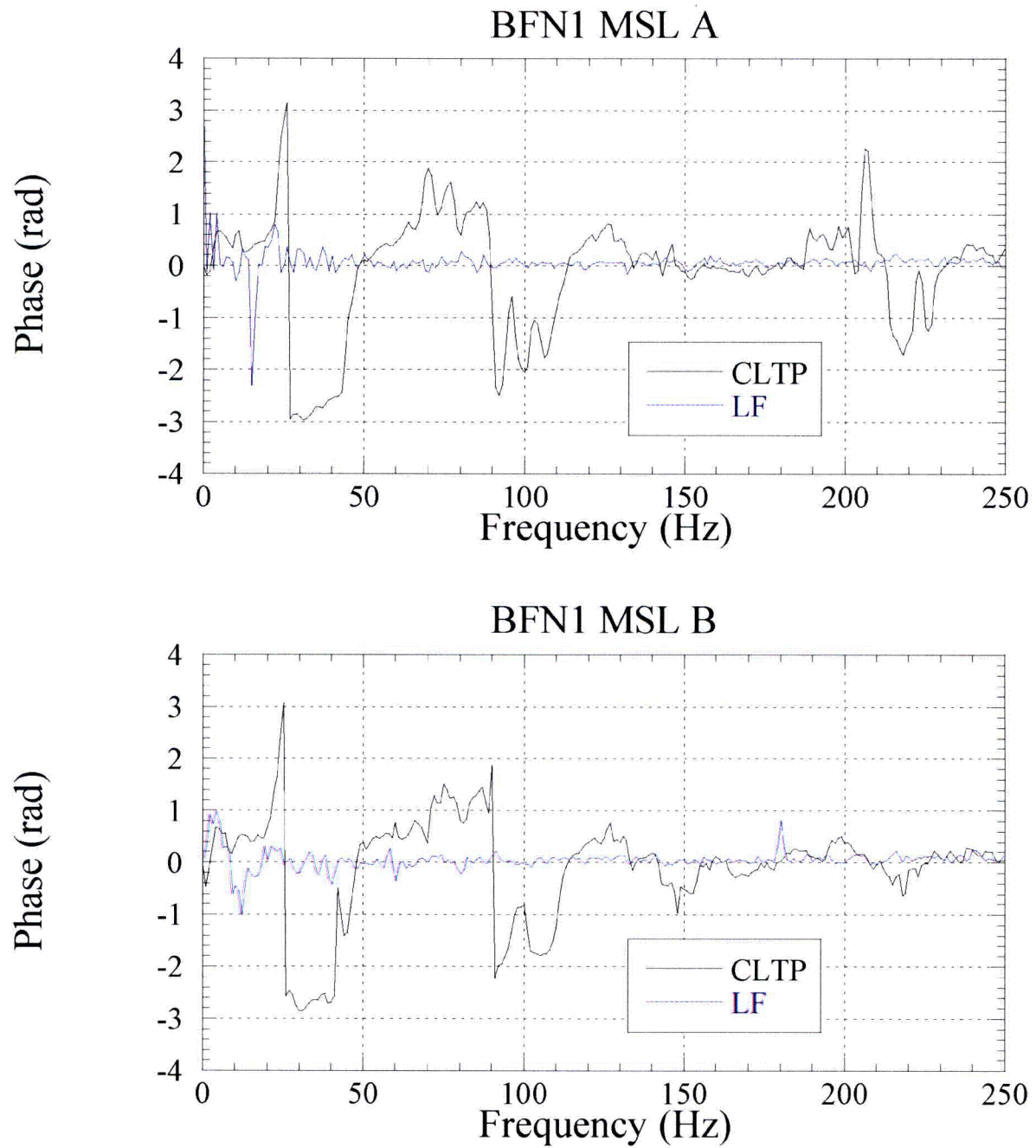
Figure EMCB.203-1.15a: Phase of notch filtered data for BFN1 main steam line A (top) and B (bottom), for CLTP conditions (black) and LF conditions (blue).
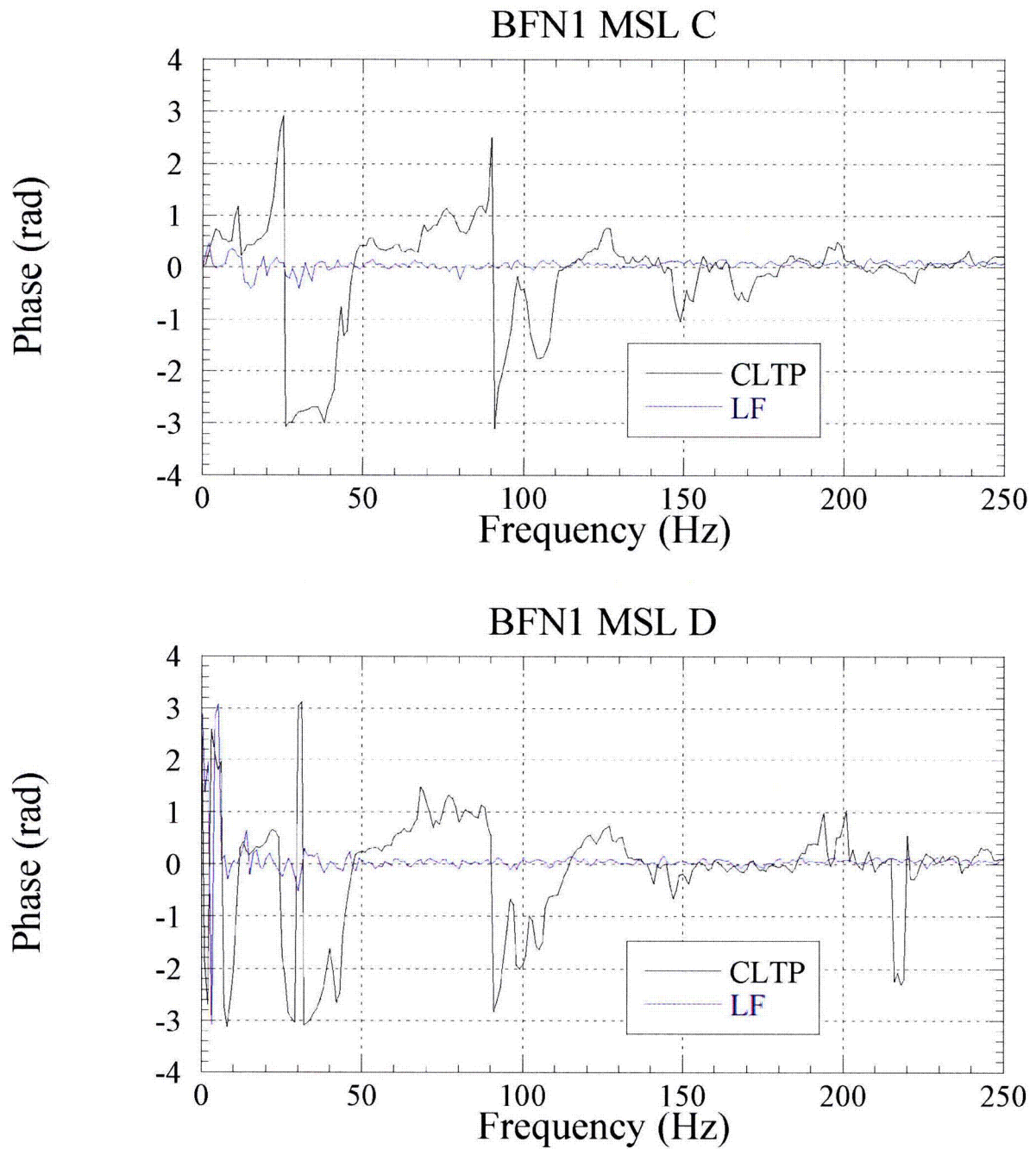
## BFN1 MSL C



## BFN1 MSL D



Figure EMCB.203-1.15b: Phase of notch filtered data for BFN1 main steam line C (top) and D (bottom), for CLTP conditions (black) and LF conditions (blue).

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**After Step 4: apply coherence and mean filter**

| Figure EMCB.203- | Contents |
|---|---|
| 1.17a | PSD of main steam line A upper and lower for CLTP and LF |
| 1.17b | PSD of main steam line B upper and lower for CLTP and LF |
| 1.17c | PSD of main steam line C upper and lower for CLTP and LF |
| 1.17d | PSD of main steam line D upper and lower for CLTP and LF |
| 1.18a | Cross spectra and coherence of main steam line A for CLTP and LF |
| 1.18b | Cross spectra and coherence of main steam line B for CLTP and LF |
| 1.18c | Cross spectra and coherence of main steam line C for CLTP and LF |
| 1.18d | Cross spectra and coherence of main steam line D for CLTP and LF |
| 1.19a | Phase of main steam lines A and B for CLTP and LF |
| 1.19b | Phase of main steam lines C and D for CLTP and LF |
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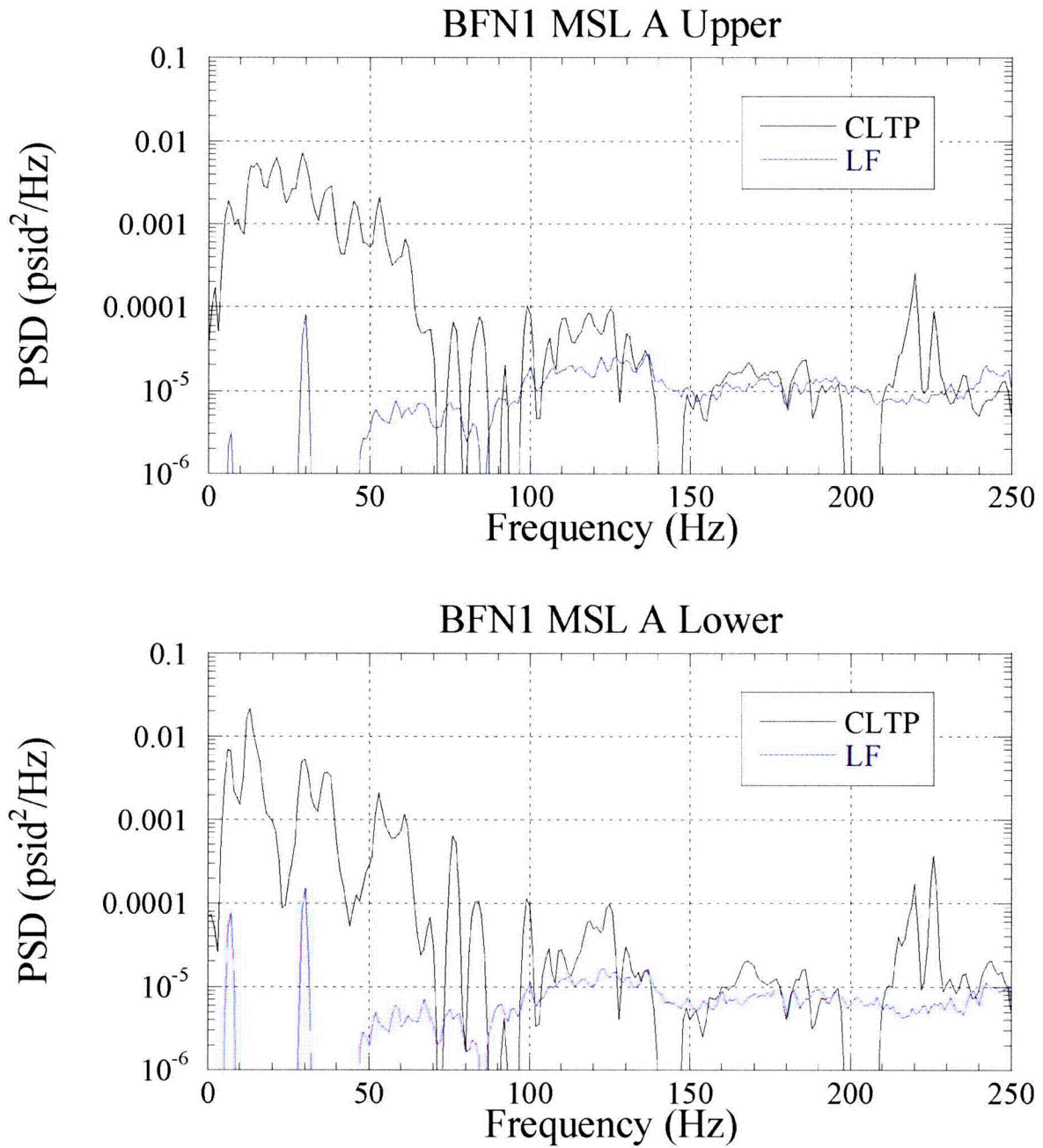
Figure EMCB.203-1.17a: Autospectra of coherence filtered data for BFN1 main steam line A: upper strain gage location (top), lower strain gage location (bottom), for CLTP conditions (black) and LF conditions (blue).
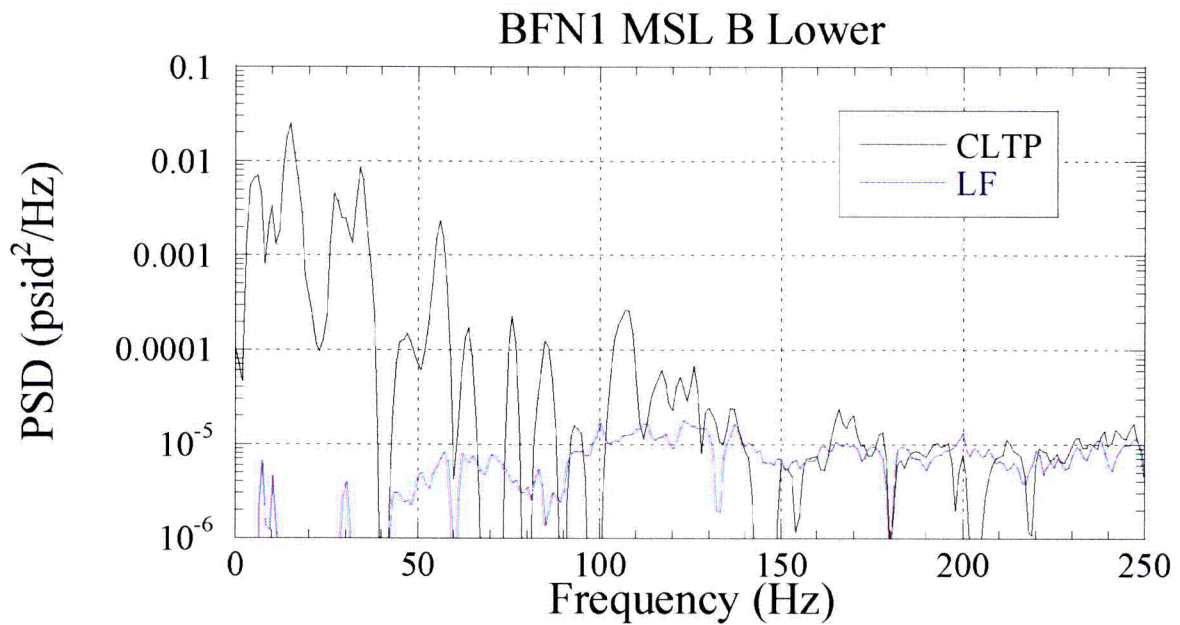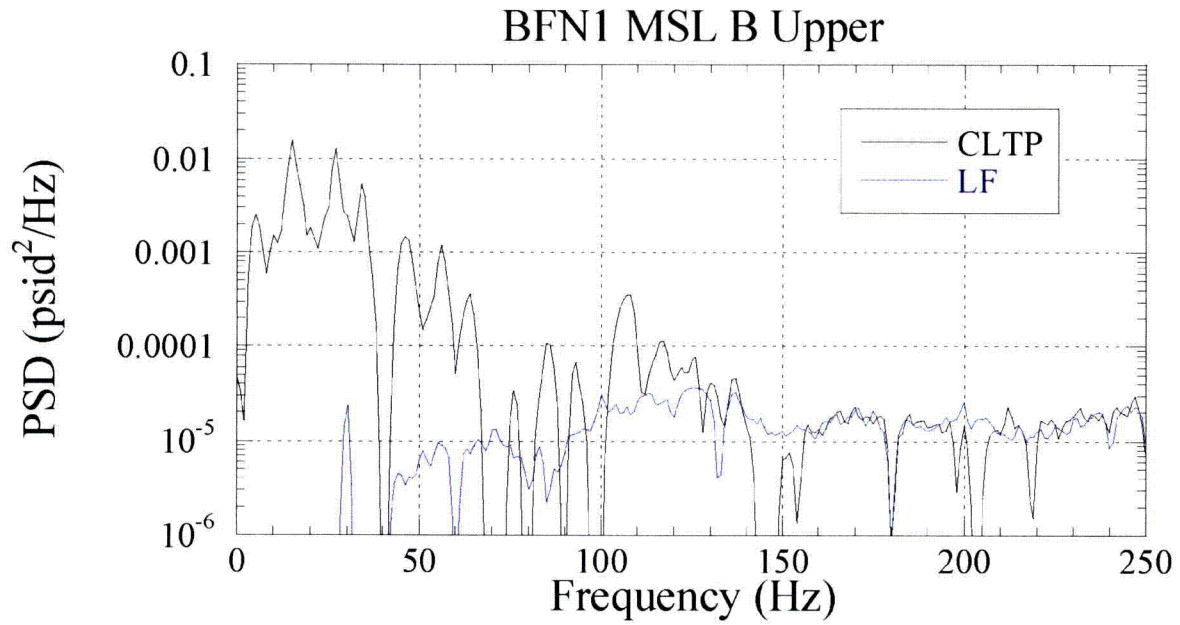
Figure EMCB.203-1.17b: Autospectra of coherence filtered data for BFN1 main steam line B: upper strain gage location (top), lower strain gage location (bottom), for CLTP conditions (black) and LF conditions (blue).

## BFN1 MSL C Upper



## BFN1 MSL C Lower



Figure EMCB.203-1.17c: Autospectra of coherence filtered data for BFN1 main steam line C: upper strain gage location (top), lower strain gage location (bottom), for CLTP conditions (black) and LF conditions (blue).
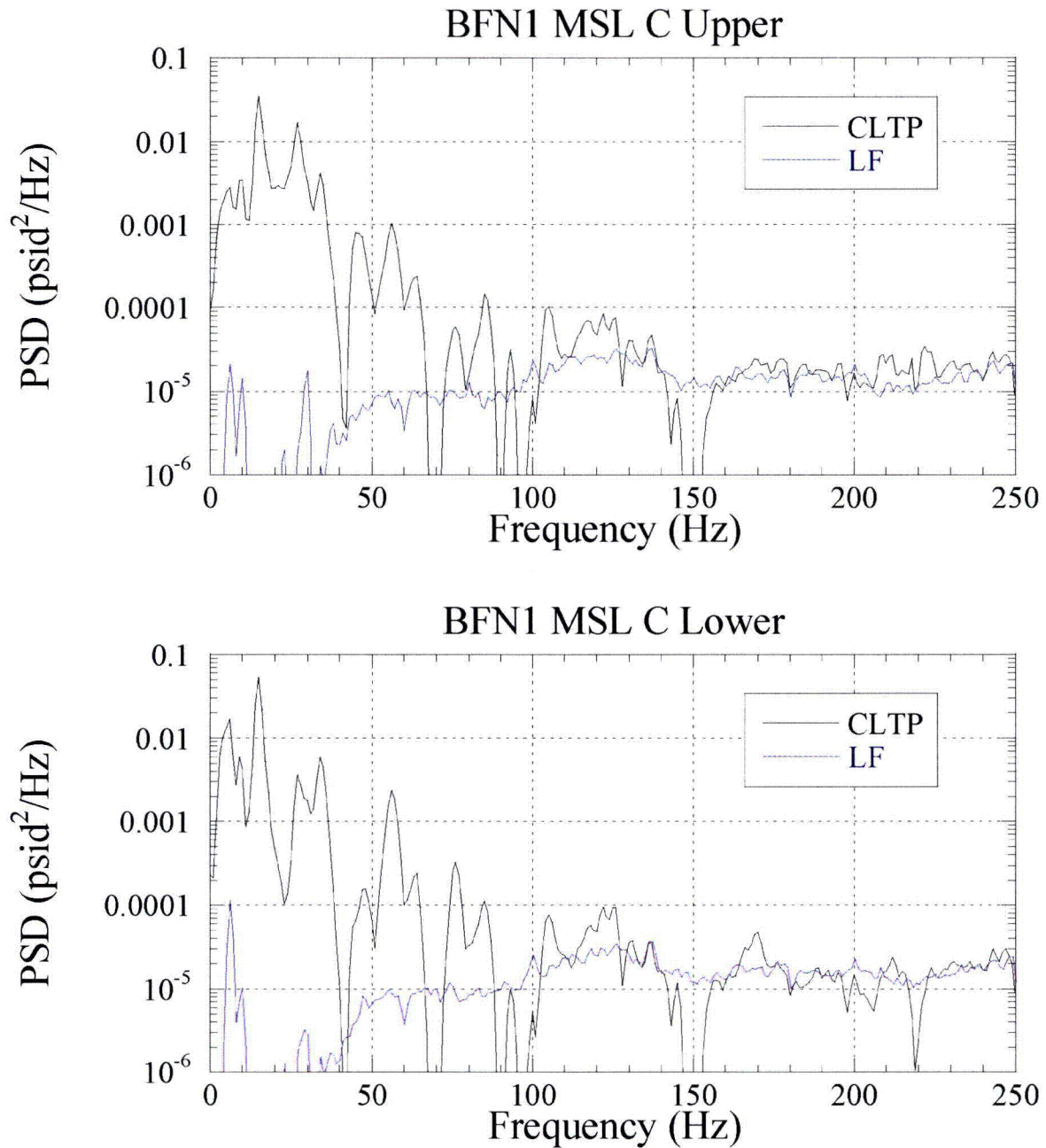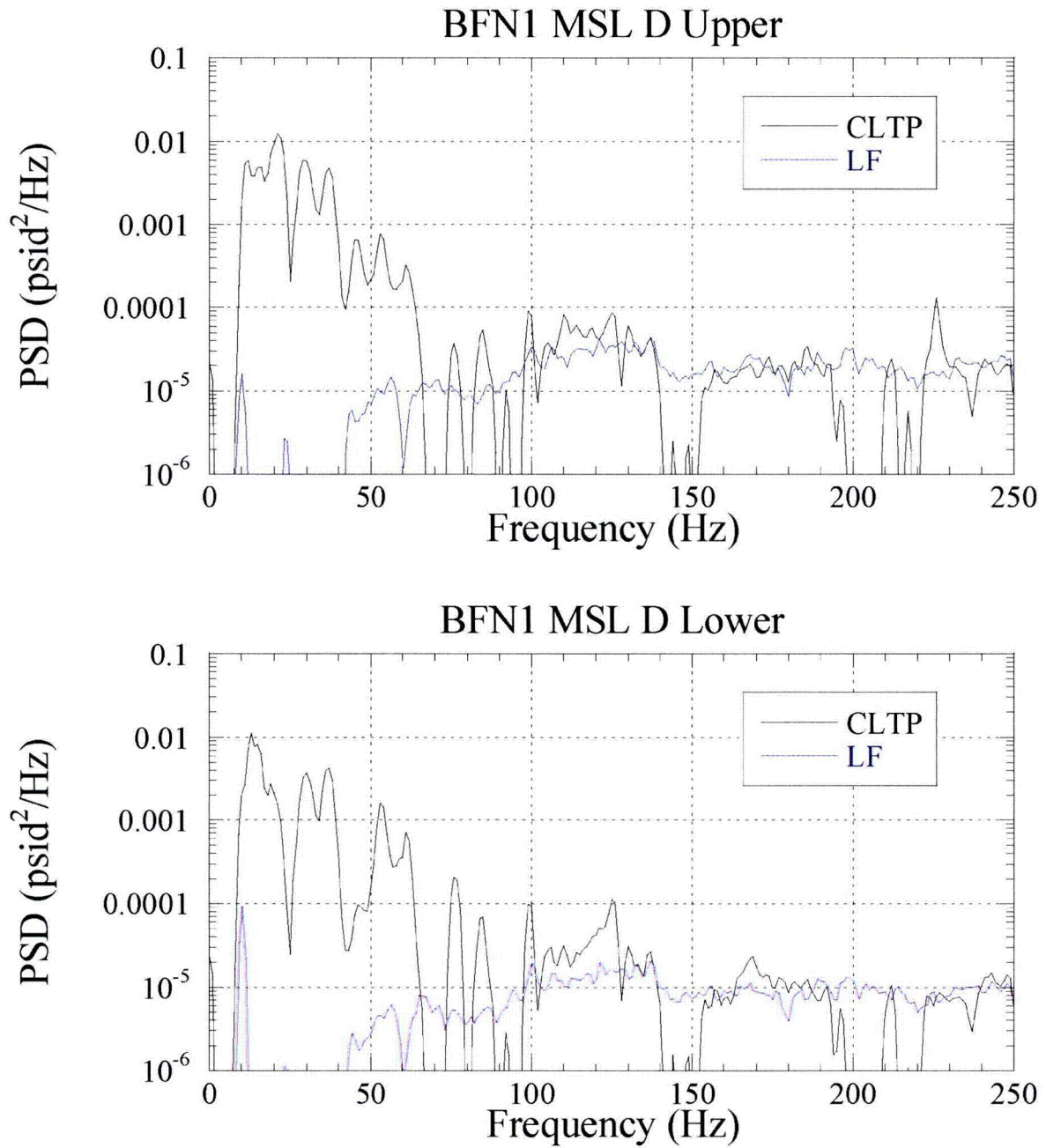
## BFN1 MSL D Upper



## BFN1 MSL D Lower



Figure EMCB.203-1.17d: Autospectra of coherence filtered data for BFN1 main steam line D: upper strain gage location (top), lower strain gage location (bottom), for CLTP conditions (black) and LF conditions (blue).
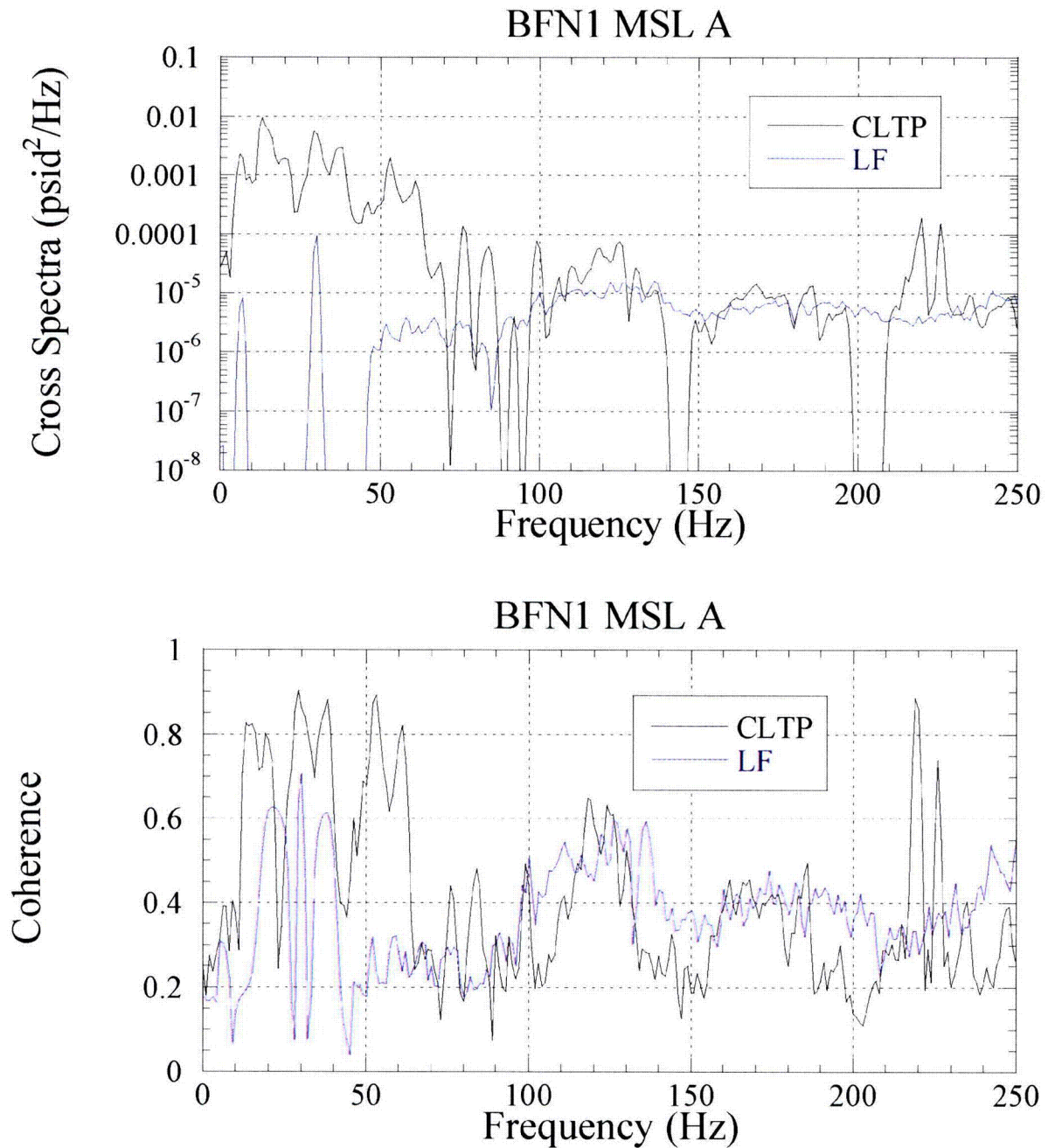
Figure EMCB.203-1.18a: Cross spectra (top) and coherence (bottom) of coherence filtered data for BFN1 main steam line A, for CLTP conditions (black) and LF conditions (blue).

Figure EMCB.203-1.18b: Cross spectra (top) and coherence (bottom) of coherence filtered data for BFN1 main steam line B, for CLTP conditions (black) and LF conditions (blue).

Figure EMCB.203-1.18c: Cross spectra (top) and coherence (bottom) of coherence filtered data for BFN1 main steam line C, for CLTP conditions (black) and LF conditions (blue).

## BFN1 MSL D



## BFN1 MSL D



Figure EMCB.203-1.18d: Cross spectra (top) and coherence (bottom) of coherence filtered data for BFN1 main steam line D, for CLTP conditions (black) and LF conditions (blue).
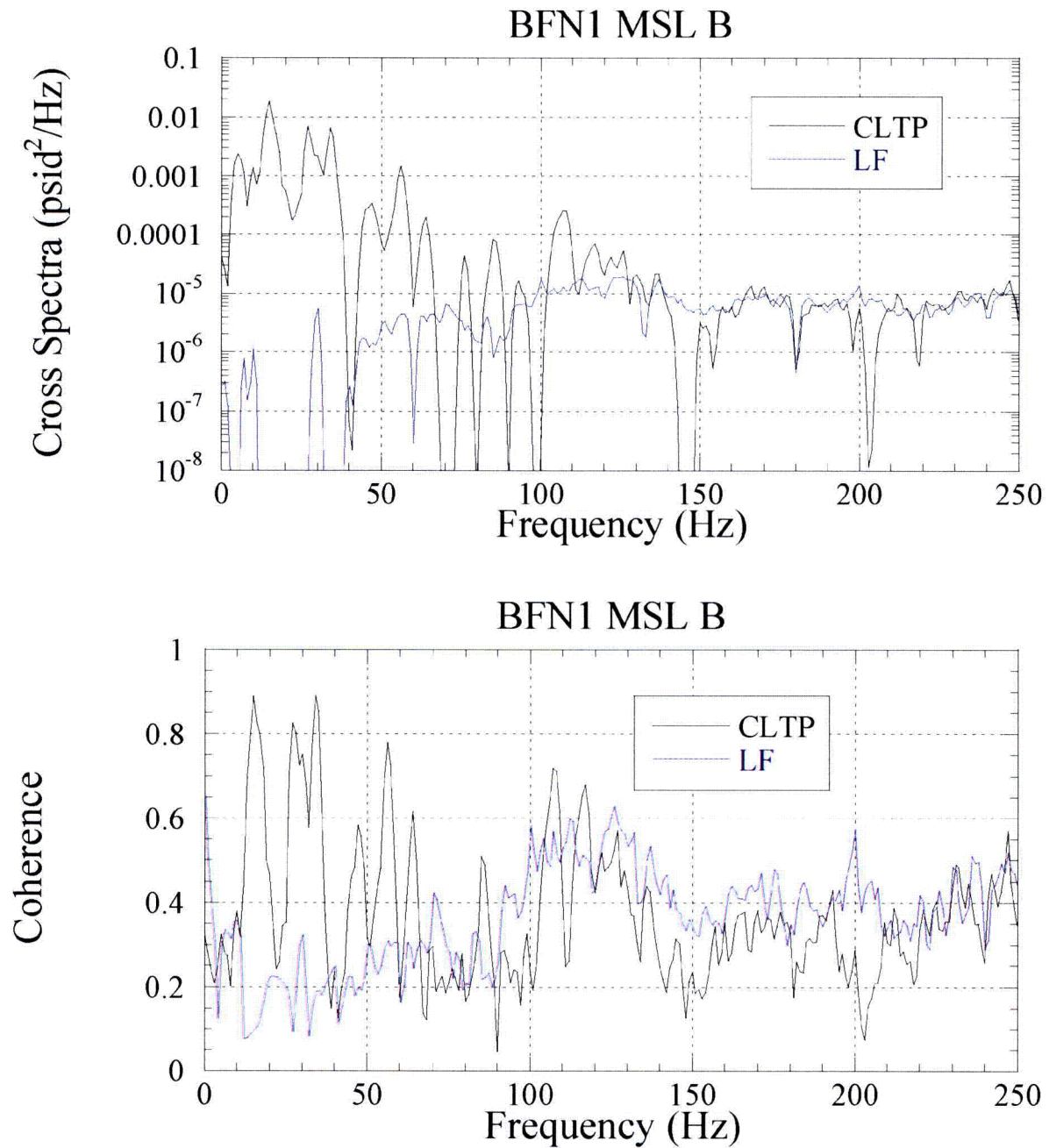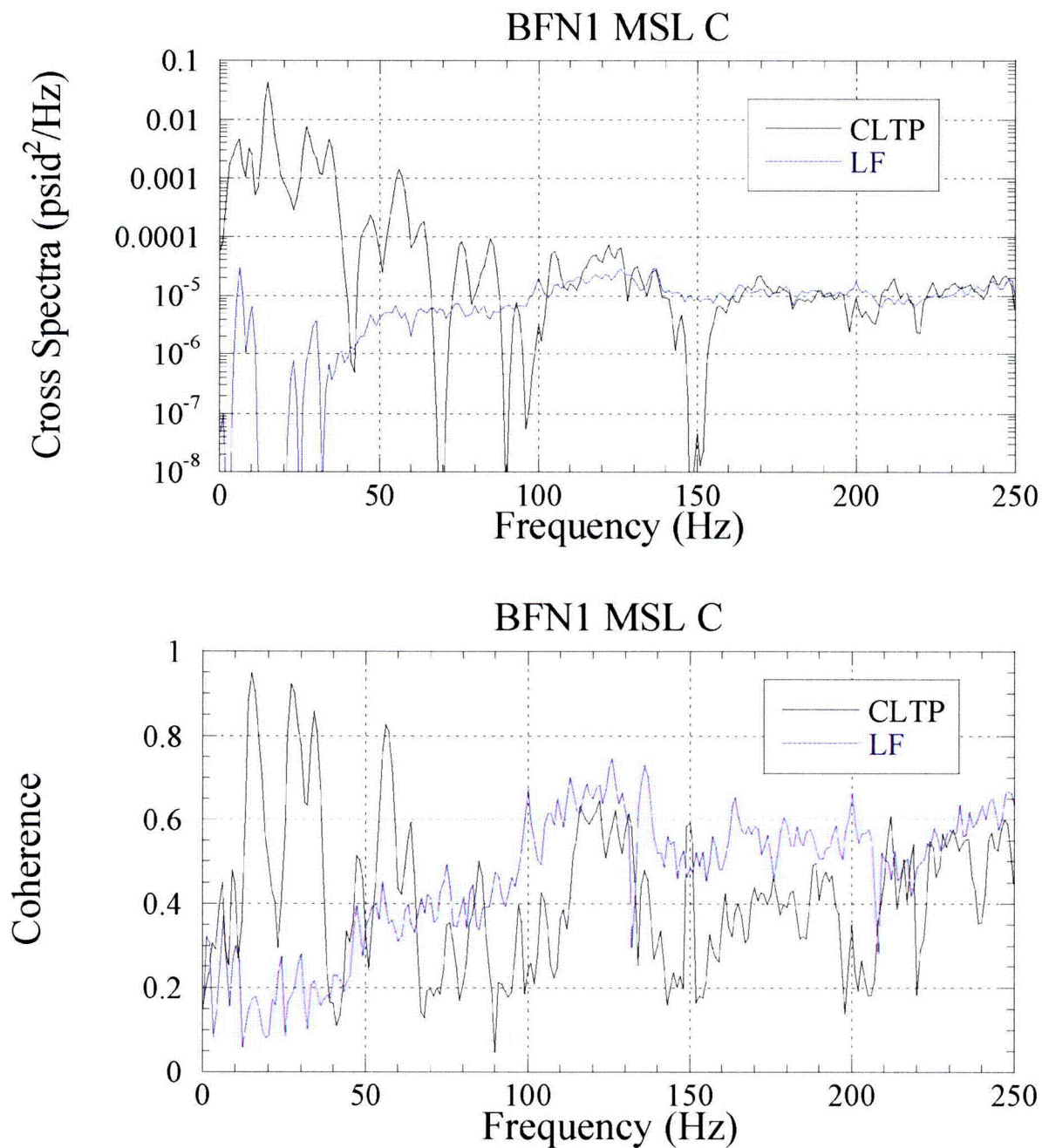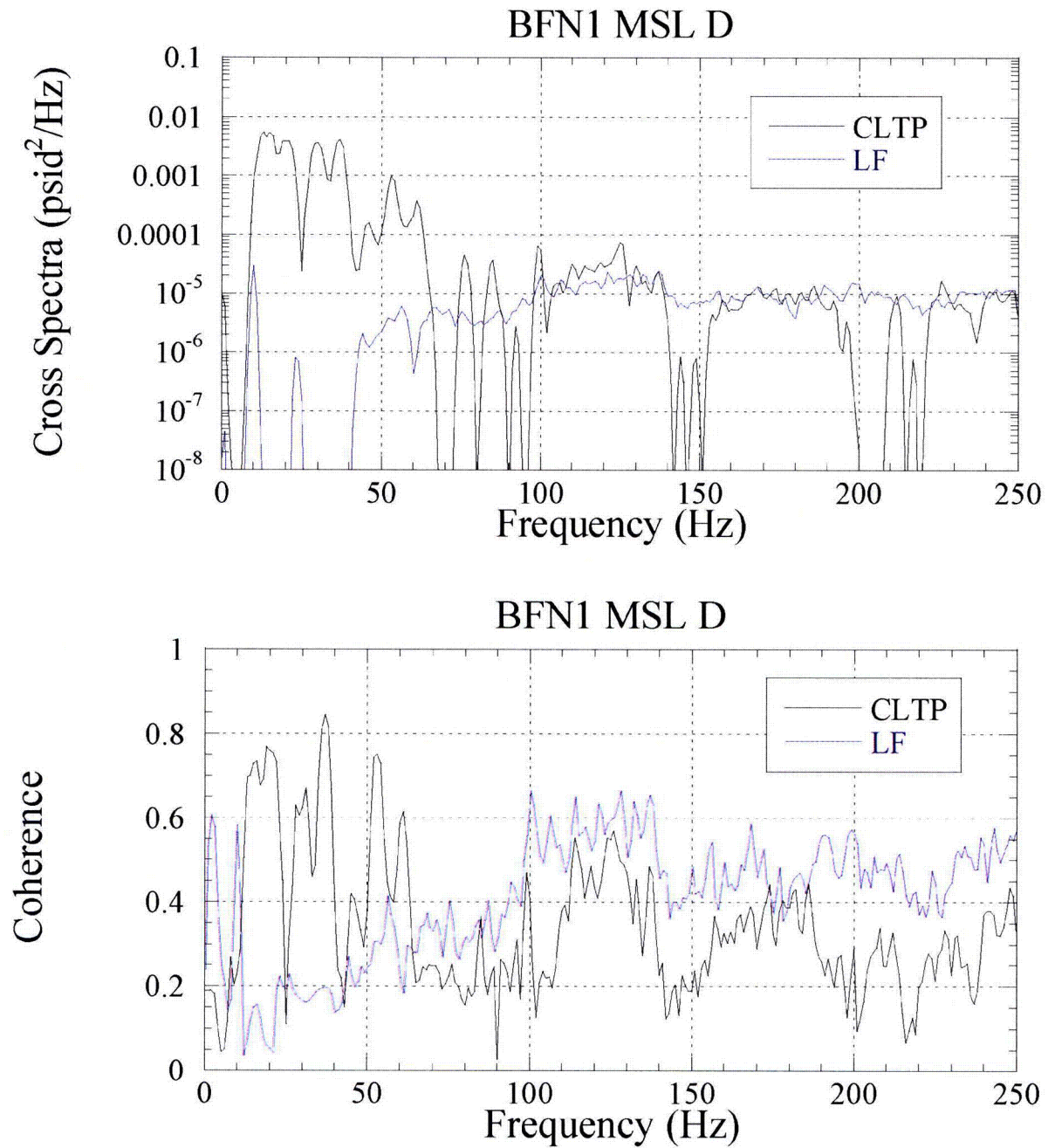
## BFN1 MSL A



## BFN1 MSL B



Figure EMCB.203-1.19a: Phase of coherence filtered data for BFN1 main steam line A (top) and B (bottom), for CLTP conditions (black) and LF conditions (blue).
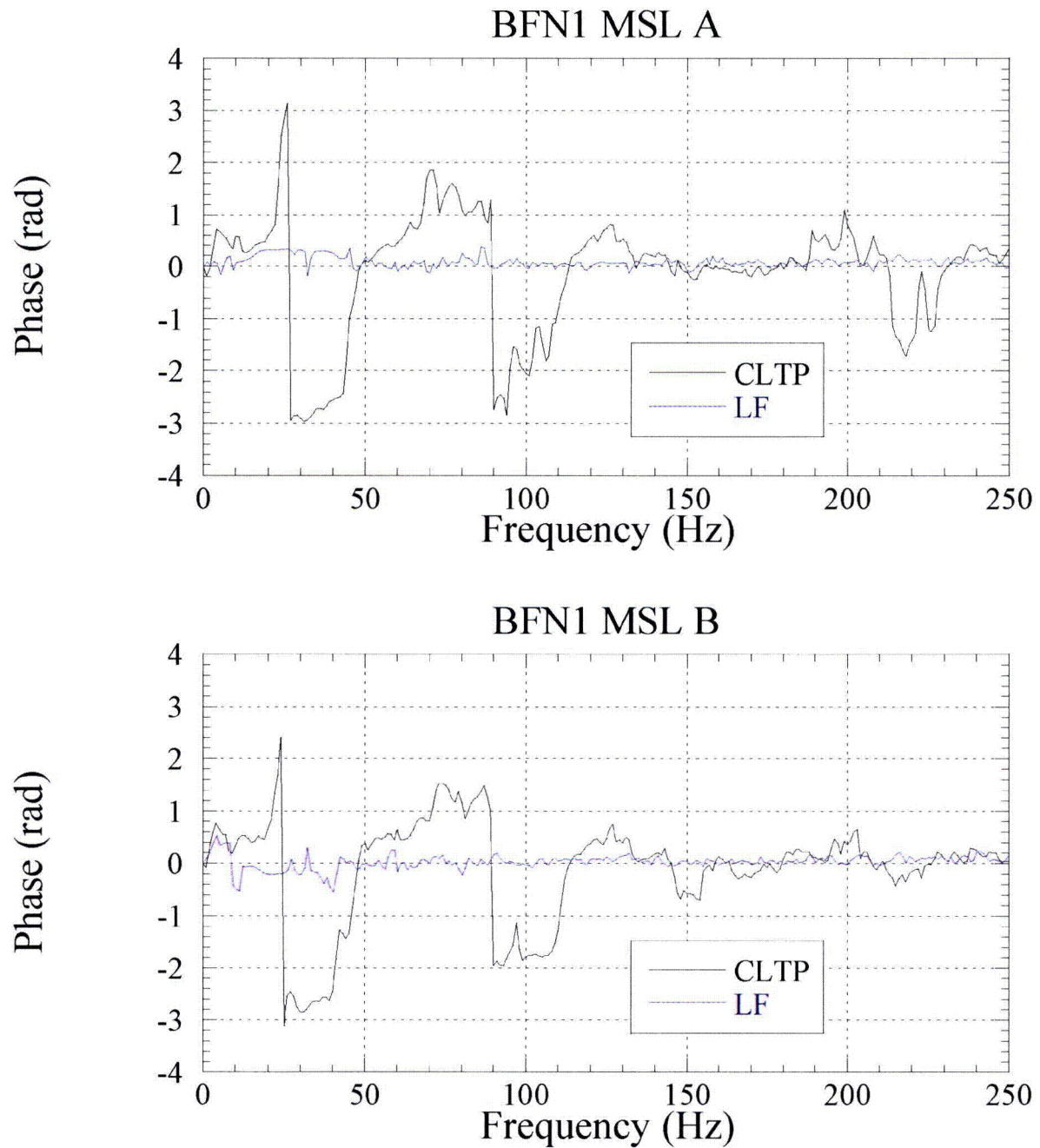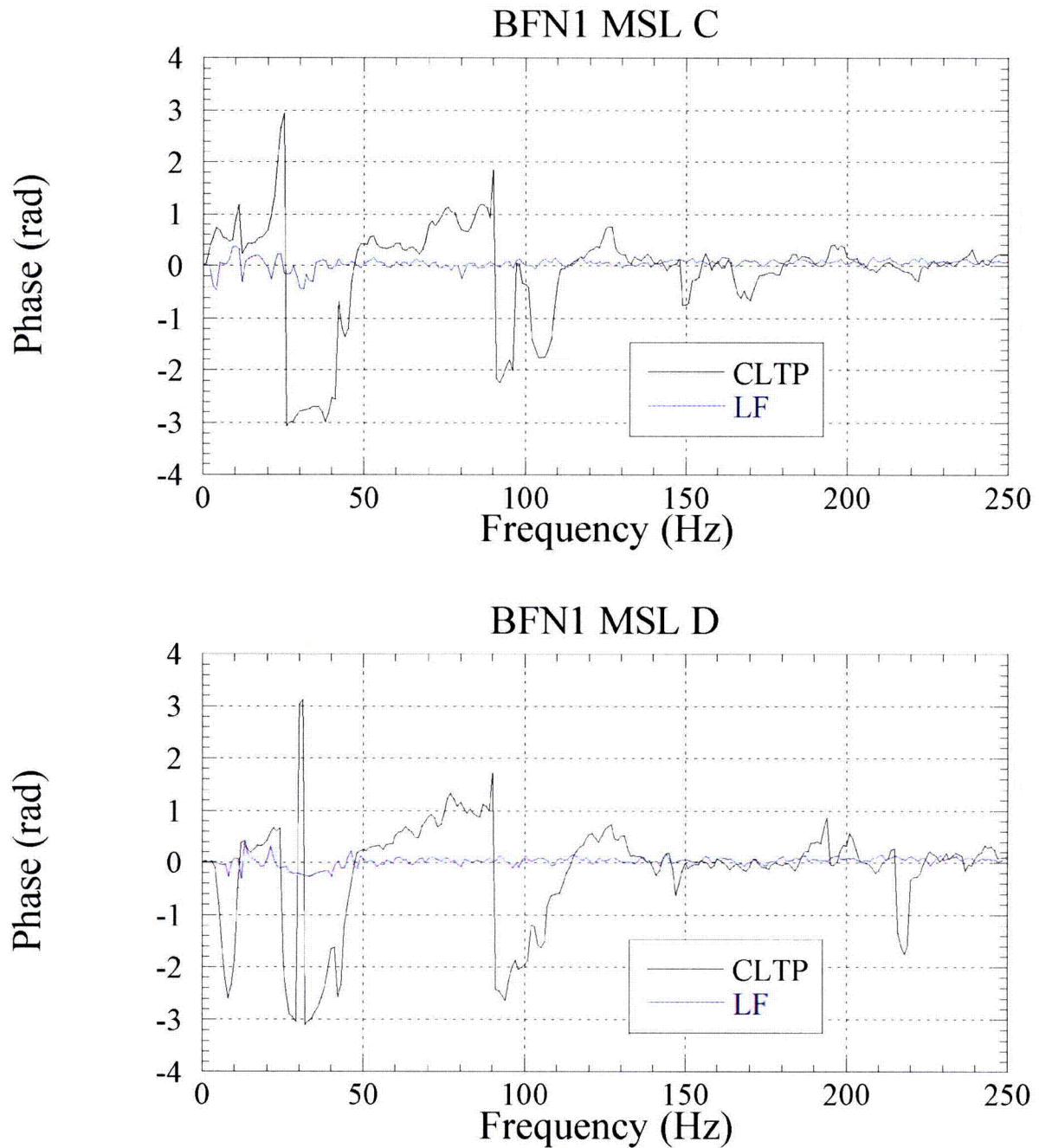
Figure EMCB.203-1.19b: Phase of coherence filtered data for BFN1 main steam line C (top) and D (bottom), for CLTP conditions (black) and LF conditions (blue).

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## After Step 6: subtract low flow and apply bias and uncertainty

| Figure EMCB.203- | Contents |
|---|---|
| 1.21a | PSD of main steam line A upper and lower for CLTP |
| 1.21b | PSD of main steam line B upper and lower for CLTP |
| 1.21c | PSD of main steam line C upper and lower for CLTP |
| 1.21d | PSD of main steam line D upper and lower for CLTP |
| 1.22a | Cross spectra and coherence of main steam line A for CLTP |
| 1.22b | Cross spectra and coherence of main steam line B for CLTP |
| 1.22c | Cross spectra and coherence of main steam line C for CLTP |
| 1.22d | Cross spectra and coherence of main steam line D for CLTP |
| 1.23a | Phase of main steam lines A and B for CLTP |
| 1.23b | Phase of main steam lines C and D for CLTP |
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Figure EMCB.203-1.21a: Autospectra of CLTP data with LF subtracted and bias and uncertainty applied, for BFN1 main steam line A: upper strain gage location (top), lower strain gage location (bottom).

Figure EMCB.203-1.21b: Autospectra of CLTP data with LF subtracted and bias and uncertainty applied, for BFN1 main steam line B: upper strain gage location (top), lower strain gage location (bottom).
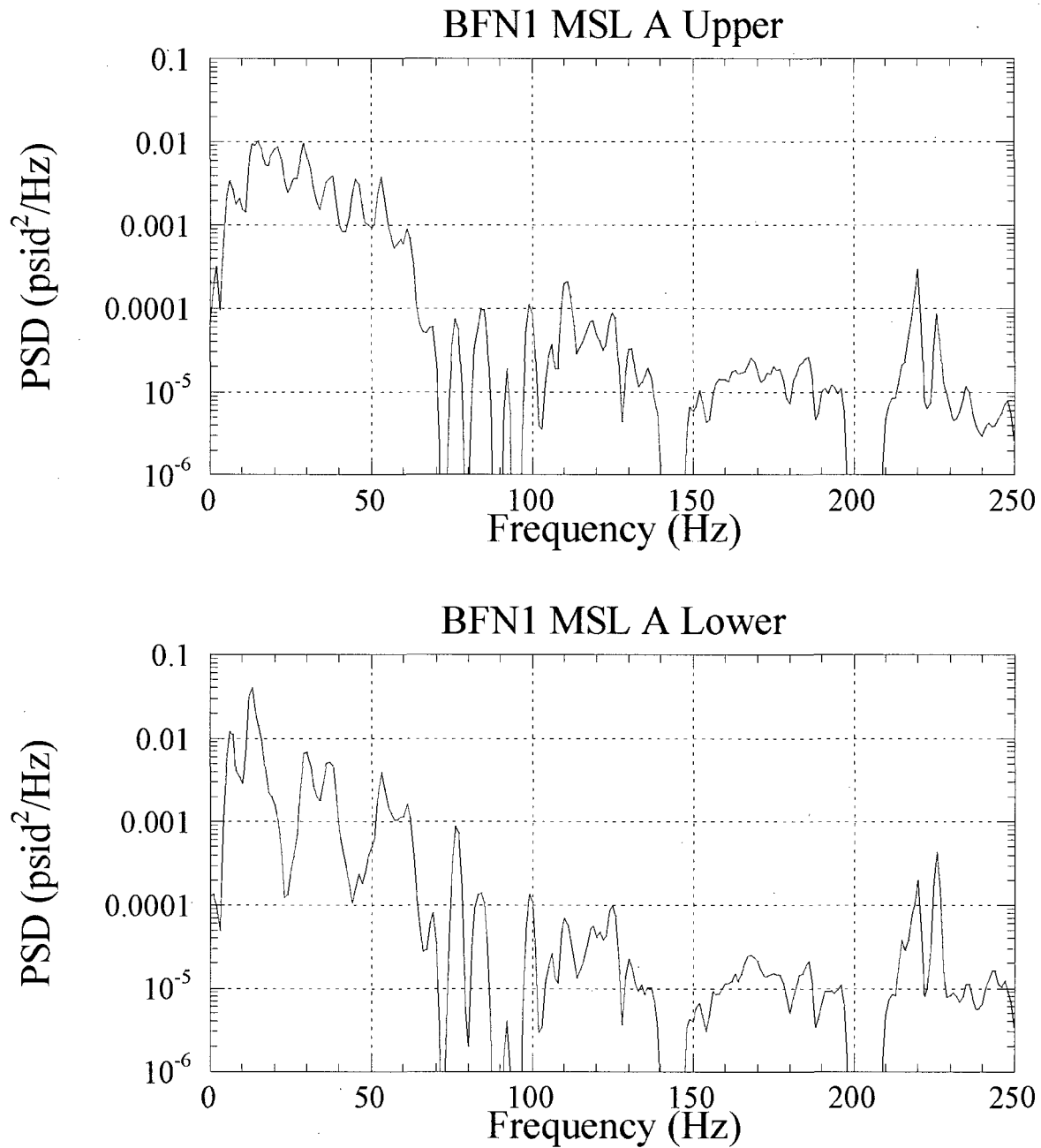
Figure EMCB.203-1.21c: Autospectra of CLTP data with LF subtracted and bias and uncertainty applied, for BFN1 main steam line C: upper strain gage location (top), lower strain gage location (bottom).

Figure EMCB.203-1.21d: Autospectra of CLTP data with LF subtracted and bias and uncertainty applied, for BFN1 main steam line D: upper strain gage location (top), lower strain gage location (bottom).
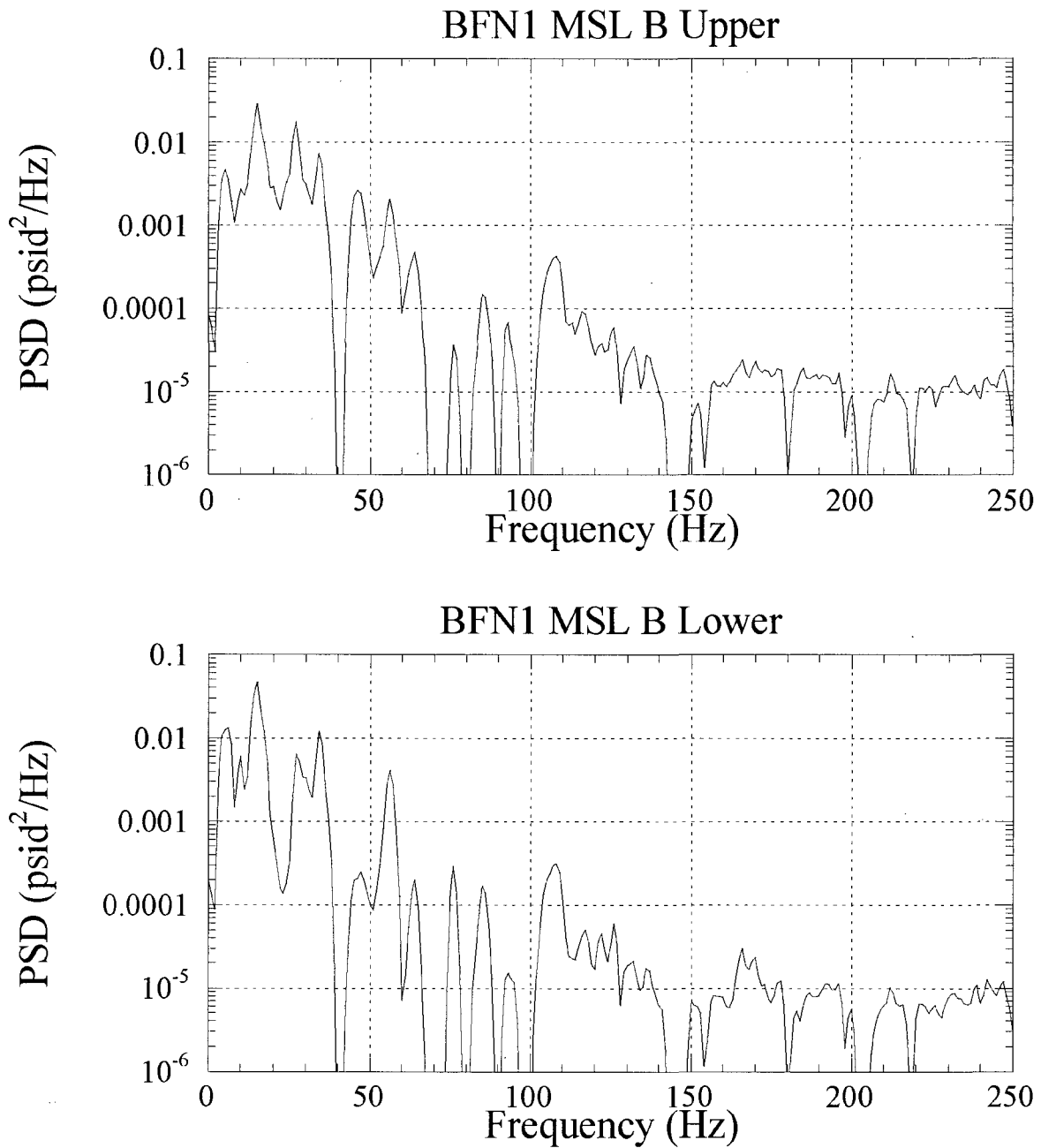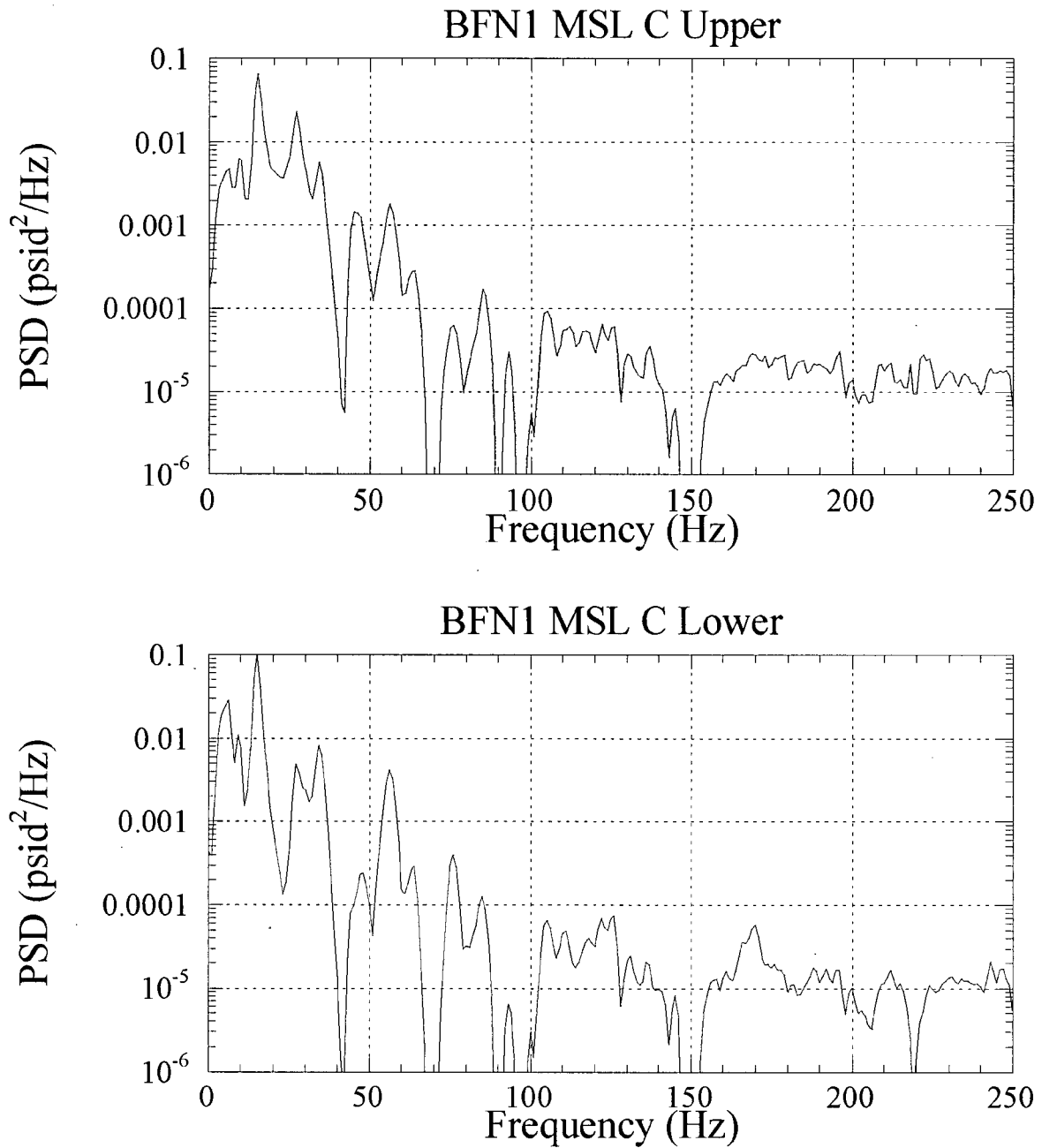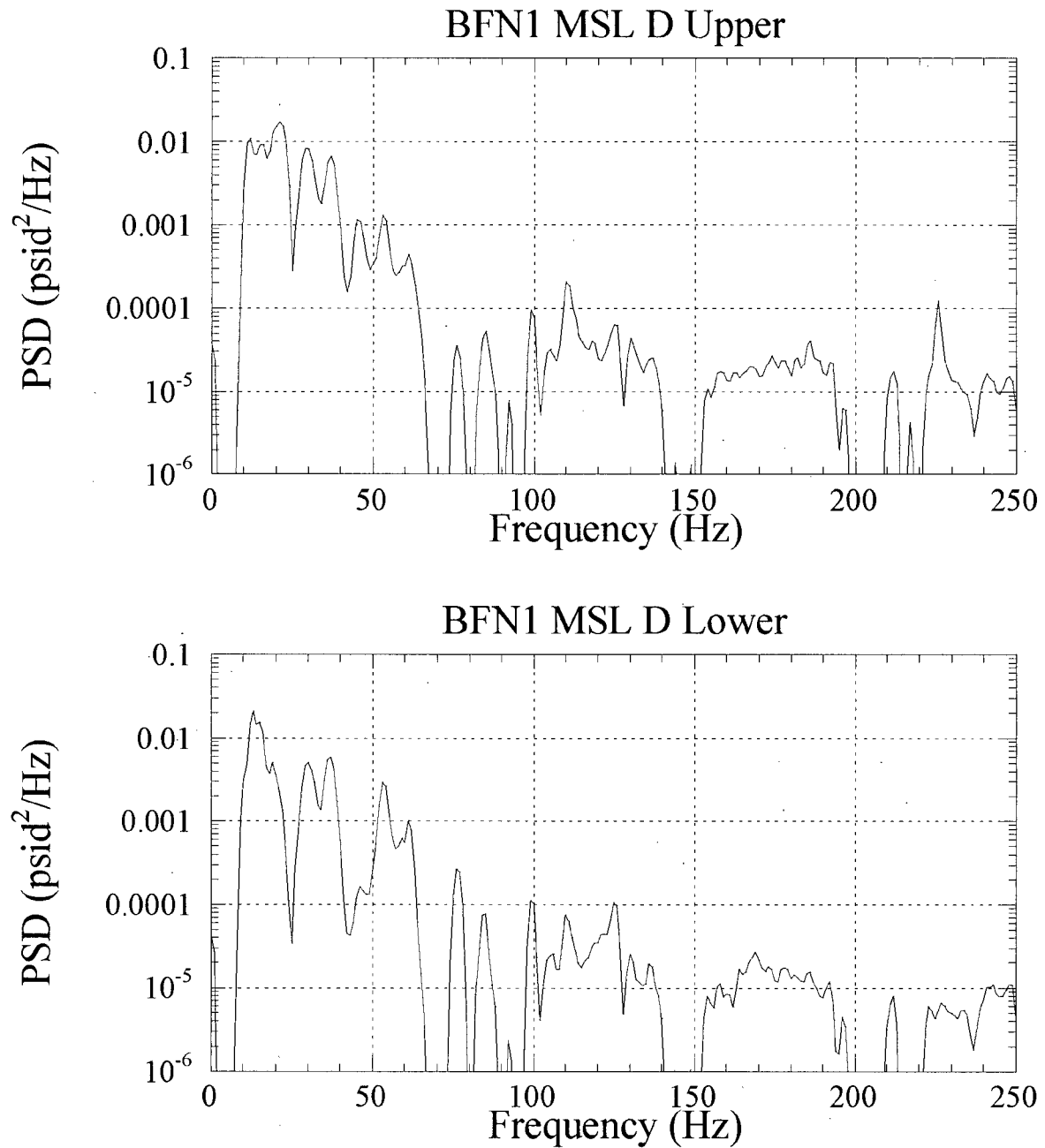
Figure EMCB.203-1.22a: Cross spectra (top) and coherence (bottom) of CLTP data with LF subtracted and bias and uncertainty applied, for BFN1 main steam line A.

Figure EMCB.203-1.22b: Cross spectra (top) and coherence (bottom) of CLTP data with LF subtracted and bias and uncertainty applied, for BFN1 main steam line B.
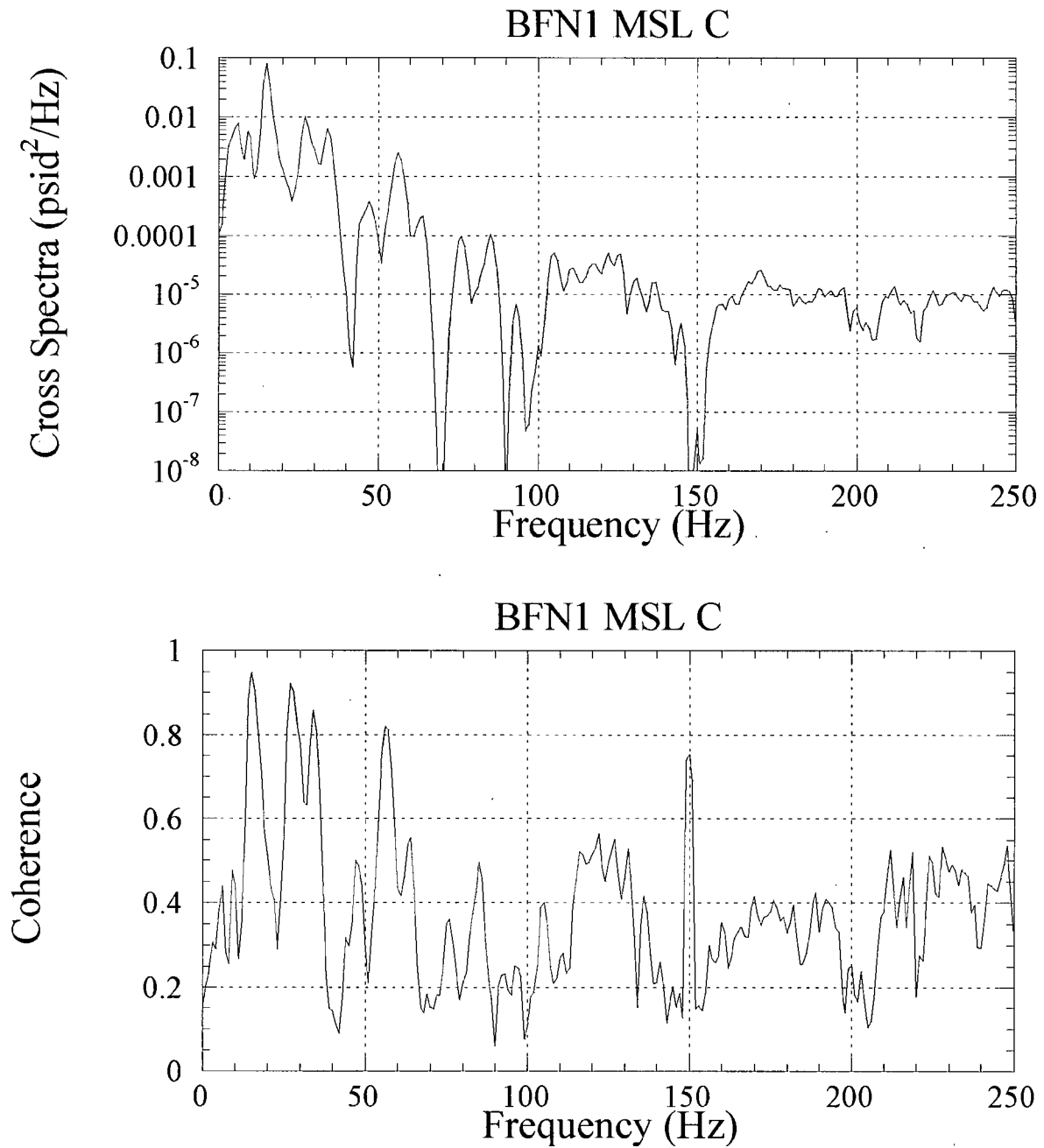
Figure EMCB.203-1.22c: Cross spectra (top) and coherence (bottom) of CLTP data with LF subtracted and bias and uncertainty applied, for BFN1 main steam line C.
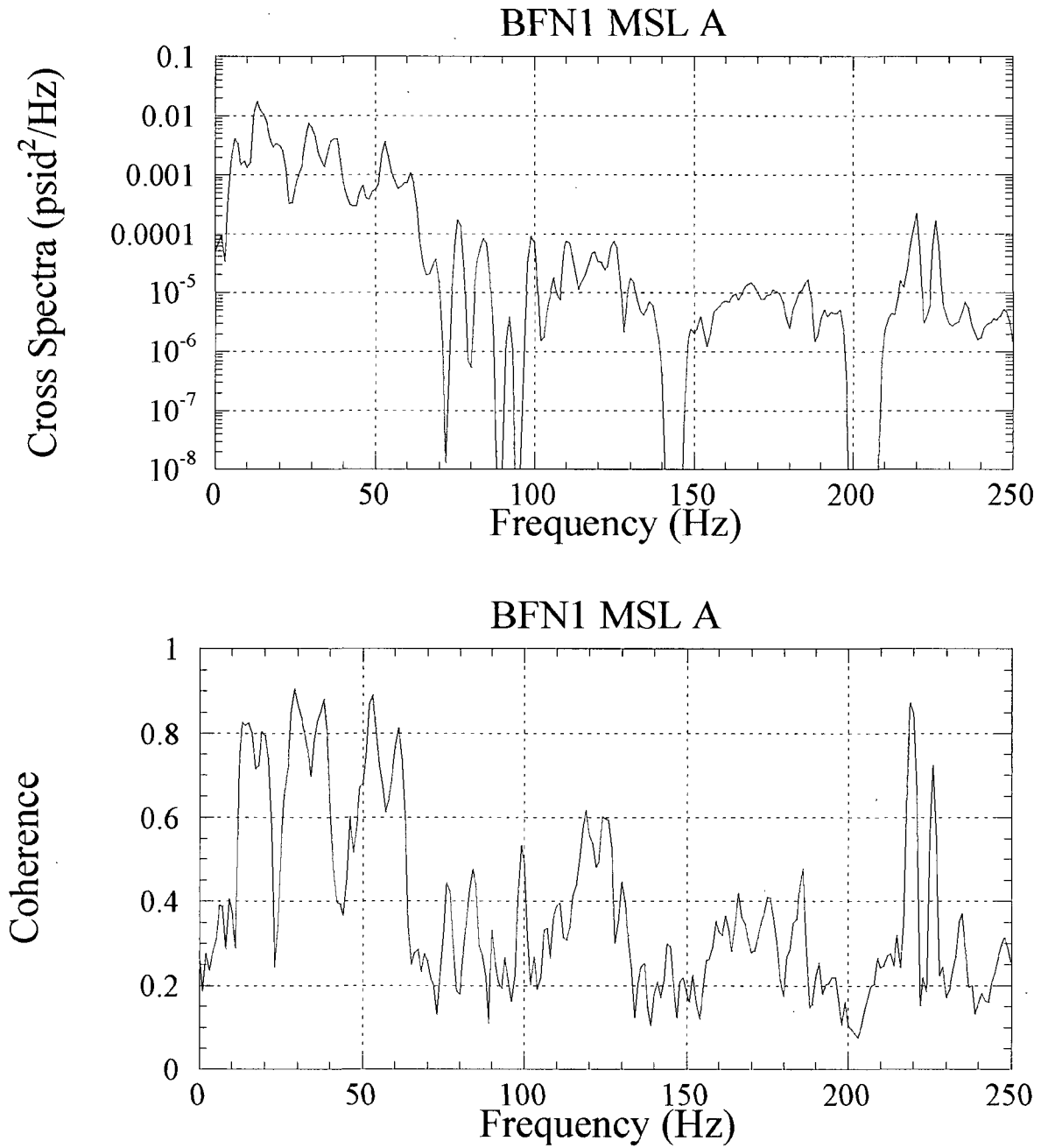
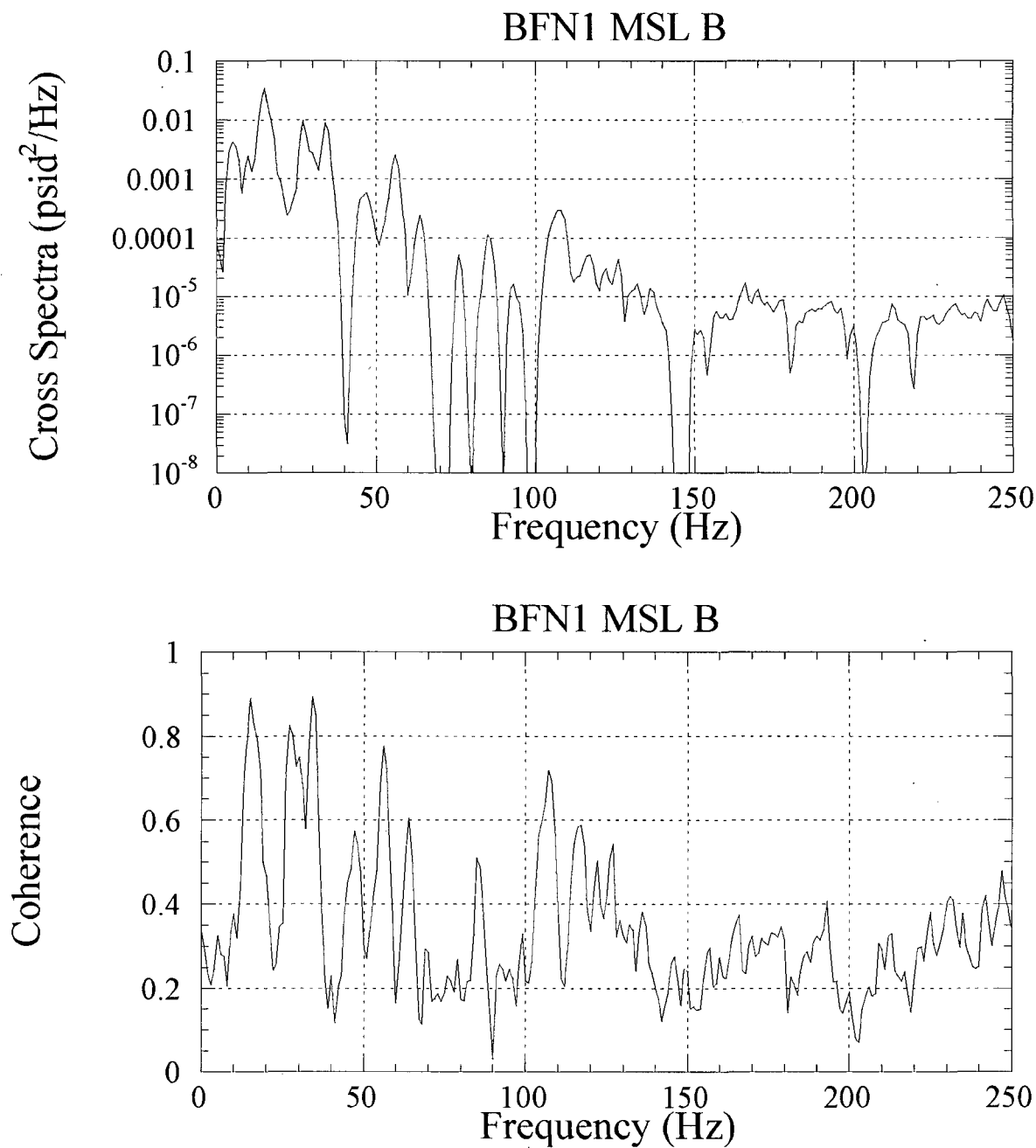## BFN1 MSL D



## BFN1 MSL D
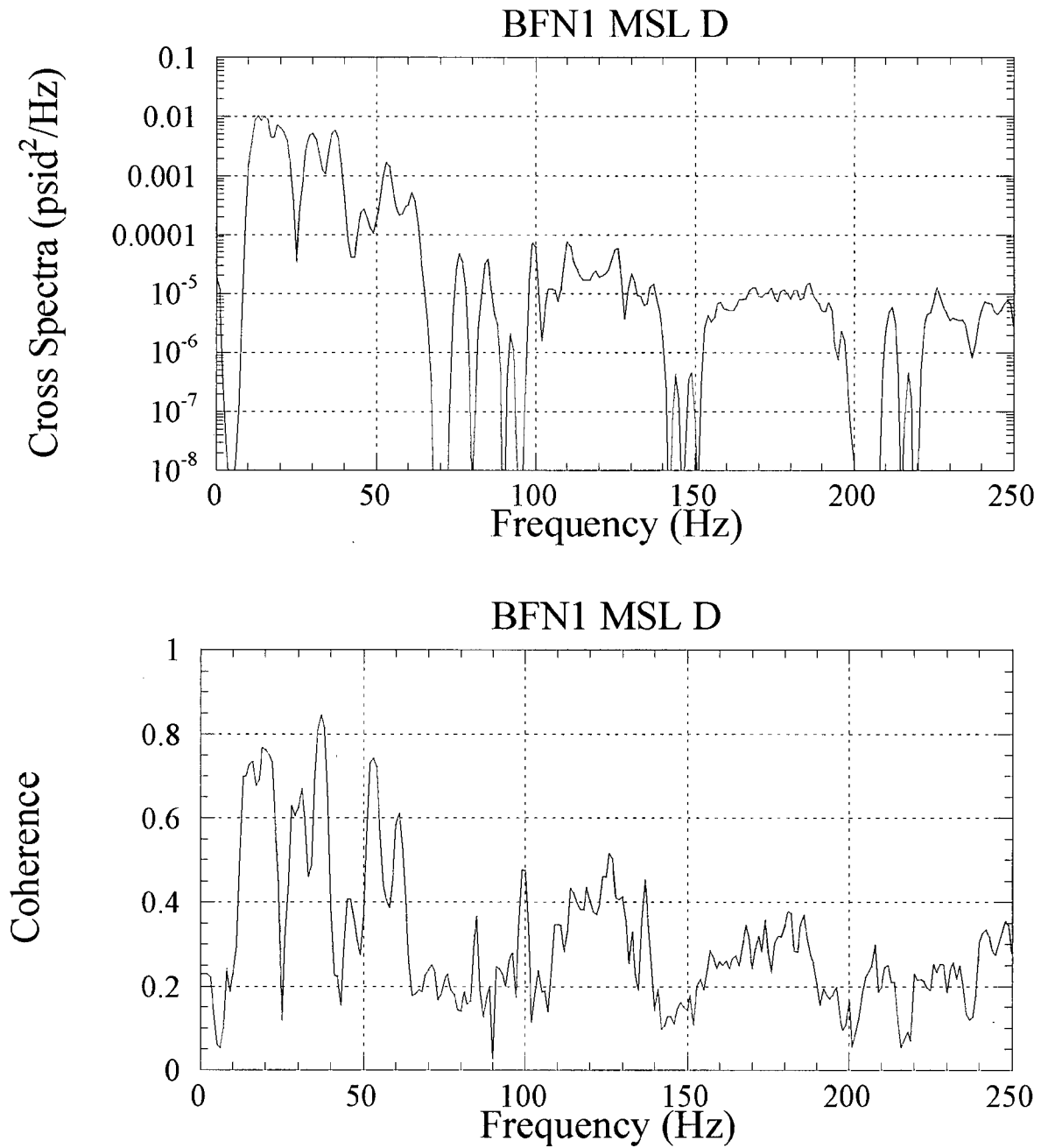


Figure EMCB.203-1.22d: Cross spectra (top) and coherence (bottom) of CLTP data with LF subtracted and bias and uncertainty applied, for BFN1 main steam line D.

## BFN1 MSL A



## BFN1 MSL B



Figure EMCB.203-1.23a: Phase of CLTP data with LF subtracted and bias and uncertainty applied, for BFN1 main steam line A (top) and B (bottom).

## BFN1 MSL C



## BFN1 MSL D
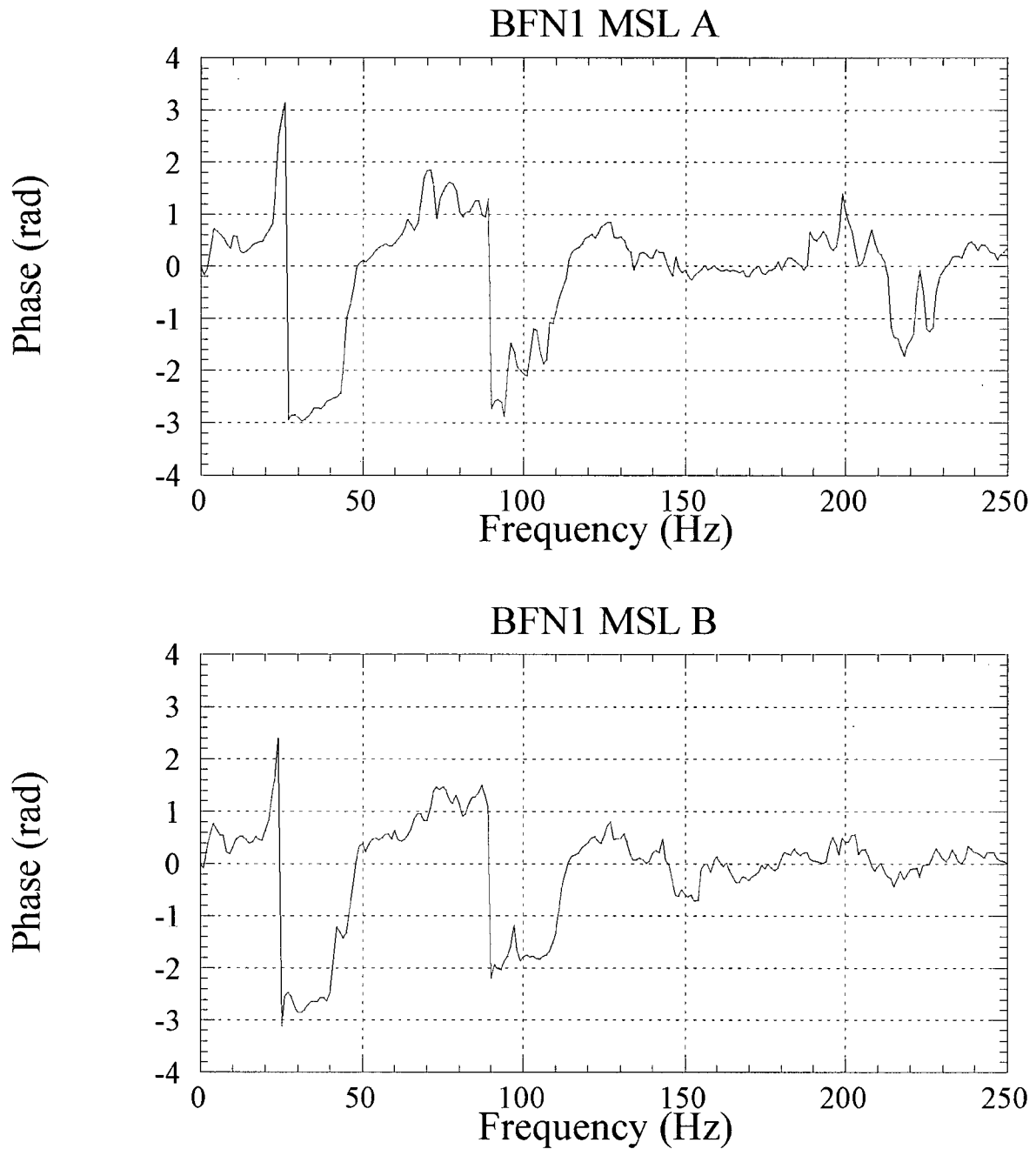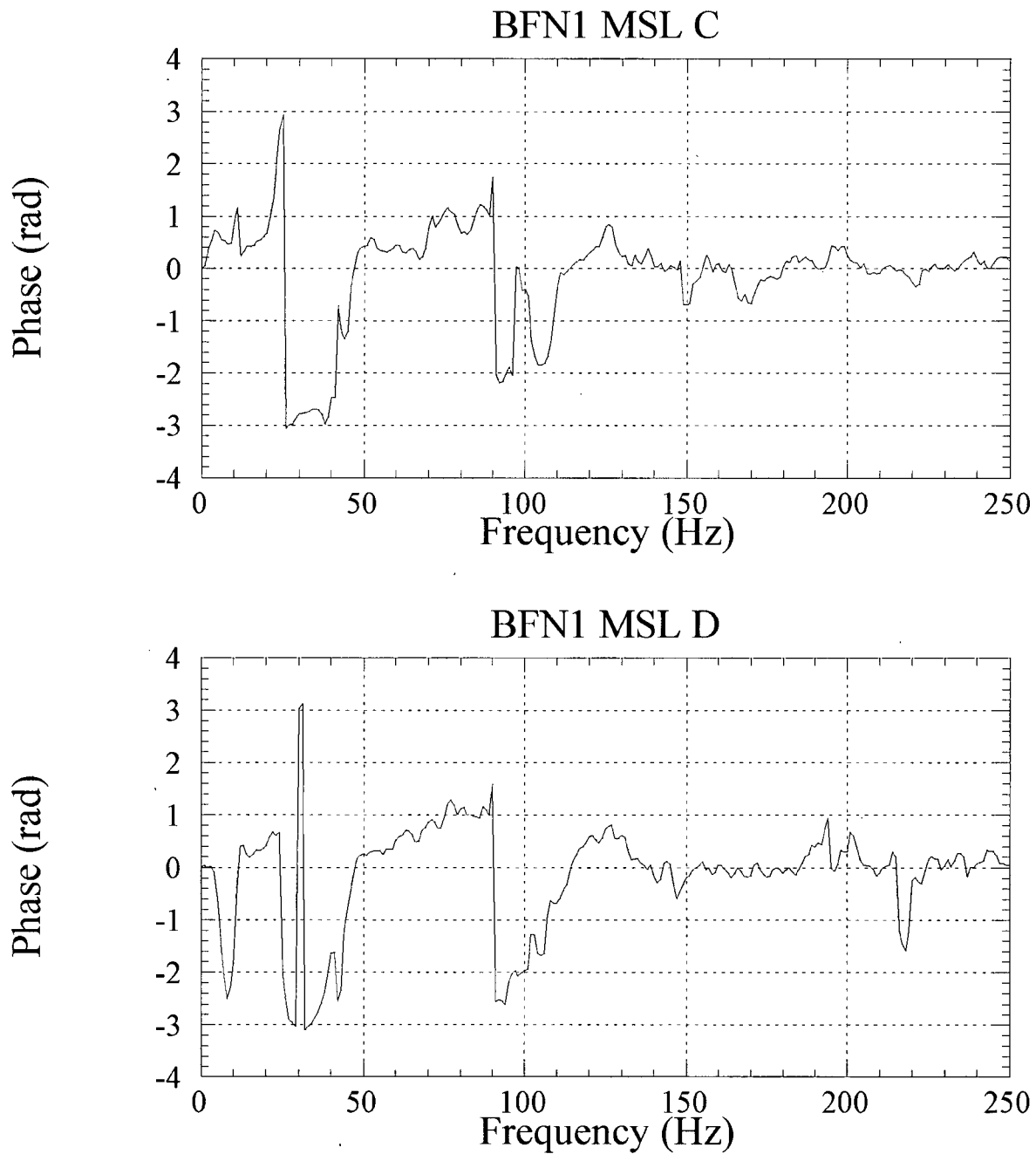


Figure EMCB.203-1.23b: Phase of CLTP data with LF subtracted and bias and uncertainty applied, for BFN1 main steam line C (top) and D (bottom).

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## NRC RAI EMCB.165 (Unit 2)

In EMCB.159, TVA was asked to compare filtered signals for lines A and D to substantiate strain gage signal substitution in Unit 2. Provide a comparison of the following:

a) The PSD of $(CLTP - EICCLTP)_{A\text{-upper}}$ with the PSD of $(CLTP - EICCLTP)_{D\text{-upper}}$;

b) The PSD of $(LF - EICLF)_{A\text{-upper}}$ with the PSD of $(LF - EICLF)$; and

c) The filtered [[                                  ]] for the available measurements of lines A and D, e.g. at CLTP

## TVA Response to EMCB.165 (Unit 2)

Figure EMCB.165-1 provides the requested plots for a) and b). Figure EMCB.165-2 provides the requested plots for c).
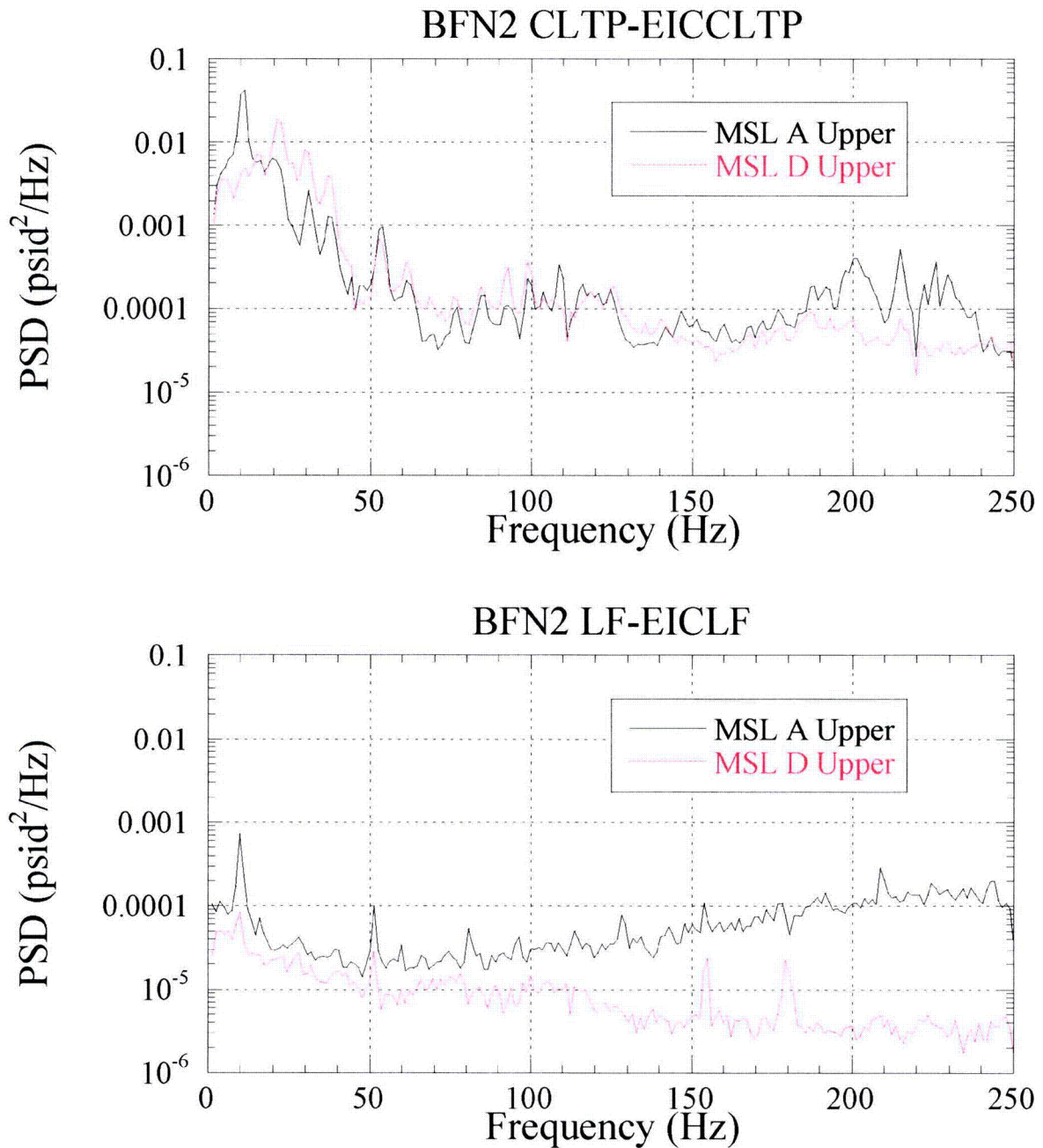
Figure EMCB.165-1: A comparison of the PSD of strain gage pressure at BFN2 MSL A Upper (black) with BFN2 MSL D Upper (red) for CLTP-EICCLTP (top) and LF-EICLF (bottom).

[[

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# ENCLOSURE 3

## TENNESSEE VALLEY AUTHORITY
## BROWNS FERRY NUCLEAR PLANT (BFN)
## UNITS 1, 2, AND 3

## TECHNICAL SPECIFICATIONS (TS) CHANGES TS-431 AND TS-418
## EXTENDED POWER UPRATE (EPU)

## CDI AFFIDAVIT

Attached is the CDI affidavit for the proprietary information contained in Enclosure 1.

## AFFIDAVIT

Re:     BROWNS FERRY NUCLEAR PLANT (BFN) – UNITS 1, 2, AND 3 –
TECHNICAL SPECIFICATIONS (TS) CHANGES TS-418 AND TS-431 –
EXTENDED POWER UPRATE (EPU) – RESPONSE TO ROUND 23
REQUEST FOR ADDITIONAL INFORMATION (RAI) REGARDING STEAM
DRYER SIGNAL PROCESSING (TAC NOS. MD5262, MD5263, AND
MD5264)

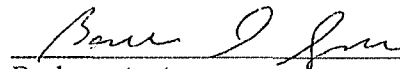I, Barbara A. Agans, being duly sworn, depose and state as follows:

1.      I hold the position of Director, Business Administration of Continuum Dynamics,
Inc. (hereinafter referred to as C.D.I.), and I am authorized to make the request for
withholding from Public Record the Information contained in the documents
described in Paragraph 2. This Affidavit is submitted to the Nuclear Regulatory
Commission (NRC) pursuant to 10 CFR 2.390(a)(4) based on the fact that the
attached information consists of trade secret(s) of C.D.I. and that the NRC will
receive the information from C.D.I. under privilege and in confidence.

2.      The Information sought to be withheld, as transmitted to TVA Browns Ferry as
attachment to C.D.I. Letter No. 09004 dated 15 January 2009, BROWNS FERRY
NUCLEAR PLANT (BFN) - UNITS 1, 2, AND 3 – TECHNICAL
SPECIFICATIONS (TS) CHANGES TS-418 AND TS-431 – EXTENDED
POWER UPRATE (EPU) – RESPONSE TO ROUND 23 REQUEST FOR
ADDITIONAL INFORMATION (RAI) REGARDING STEAM DRYER
SIGNAL PROCESSING (TAC NOS. MD5262, MD5263, AND MD5264).

3.      The Information summarizes:

(a) a process or method, including supporting data and analysis, where prevention
of its use by C.D.I.'s competitors without license from C.D.I. constitutes a
competitive advantage over other companies;
(b) Information which, if used by a competitor, would reduce his expenditure of
resources or improve his competitive position in the design, manufacture,
shipment, installation, assurance of quality, or licensing of a similar product;
(c) Information which discloses patentable subject matter for which it may be
desirable to obtain patent protection.

The information sought to be withheld is considered to be proprietary for the
reasons set forth in paragraphs 3(a), 3(b) and 3(c) above.

4. The Information has been held in confidence by C.D.I., its owner. The Information has consistently been held in confidence by C.D.I. and no public disclosure has been made and it is not available to the public. All disclosures to third parties, which have been limited, have been made pursuant to the terms and conditions contained in C.D.I.'s Nondisclosure Secrecy Agreement which must be fully executed prior to disclosure.

5. The Information is a type customarily held in confidence by C.D.I. and there is a rational basis therefore. The Information is a type, which C.D.I. considers trade secret and is held in confidence by C.D.I. because it constitutes a source of competitive advantage in the competition and performance of such work in the industry. Public disclosure of the Information is likely to cause substantial harm to C.D.I.'s competitive position and foreclose or reduce the availability of profit-making opportunities.

I declare under penalty of perjury that the foregoing affidavit and the matters stated therein are true and correct to be the best of my knowledge, information and belief.
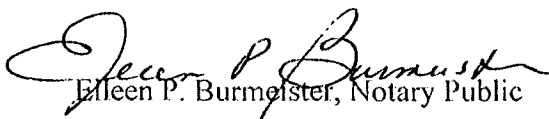
Executed on this _15__ day of ___January___ 2009.

_____
Barbara A. Agans
Continuum Dynamics, Inc.

Subscribed and sworn before me this day: ___January 15, 2009___

_____
Eileen P. Burmeister, Notary Public

EILEEN P. BURMEISTER
NOTARY PUBLIC OF NEW JERSEY
MY COMM. EXPIRES MAY 5, 2012