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Analysis of Historical Non-Destructive Evaluation Probability of Detection Data for Railroad Tank Cars: Appendices A Through I



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Appendix A. Traditional Statistics POD Summary Graphs – Fillet Welds

This appendix presents the summary of the number of observations, hits, misses and false calls for each crack interval for fillet welds (FW) for all operators and for each nondestructive evaluation (NDE) method applied. The probability of hits (POHs) are also calculated and displayed on top of the median number of hits for each crack distribution. Note that there is a crack size interval of 0-inches that corresponds to the locations in the panels where there were no cracks or flaws. This means that false calls will only appear in the zero-crack size interval for the FW as shown by the yellow bar.

Visual Testing (VT)

Figure 1 is the distribution of the frequency of number of observations, median number of hits and misses, and median of false calls for the VT method and a crack size interval of 0.5-inches. In addition, researchers presented the POH based on the relative frequency of hits per crack size interval. From the figure, note that the number of false calls is only shown in the 0-inch crack size interval and the 0.5- to 1-inch interval presents the highest number of misses and it is the only case where this number exceeds the number of hits.

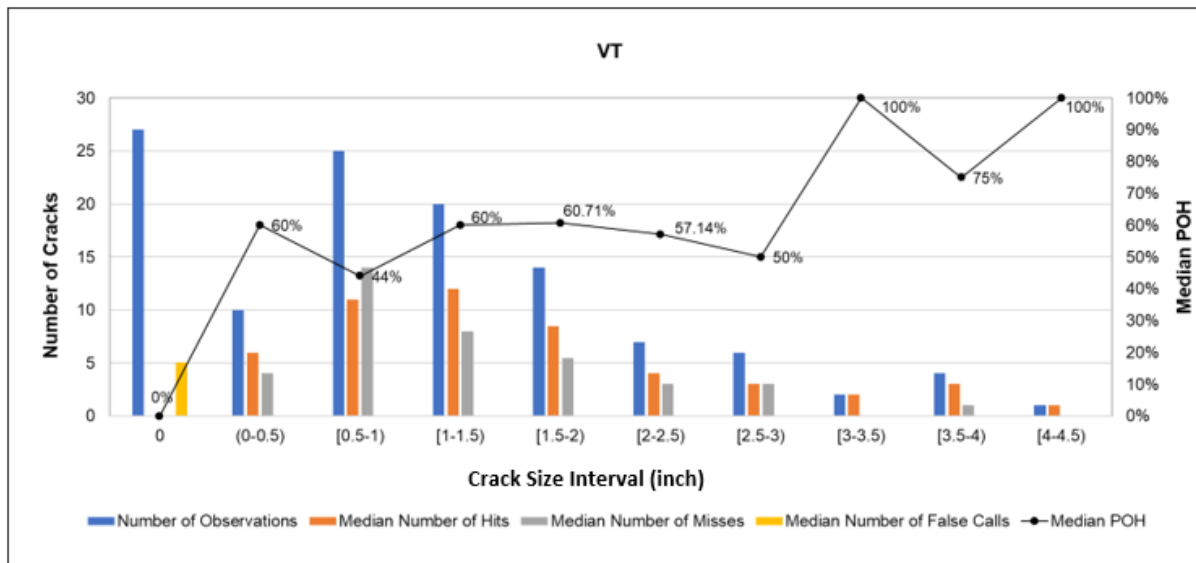


Figure 1. VT Summary for FW Panels

Figure 2 is the box plot for the frequency of the number of cracks, hits, misses and false calls per crack size interval. The figure shows that 0.5- to 1-inch and 1- to 1.5-inch crack size intervals show the highest variability in the data.

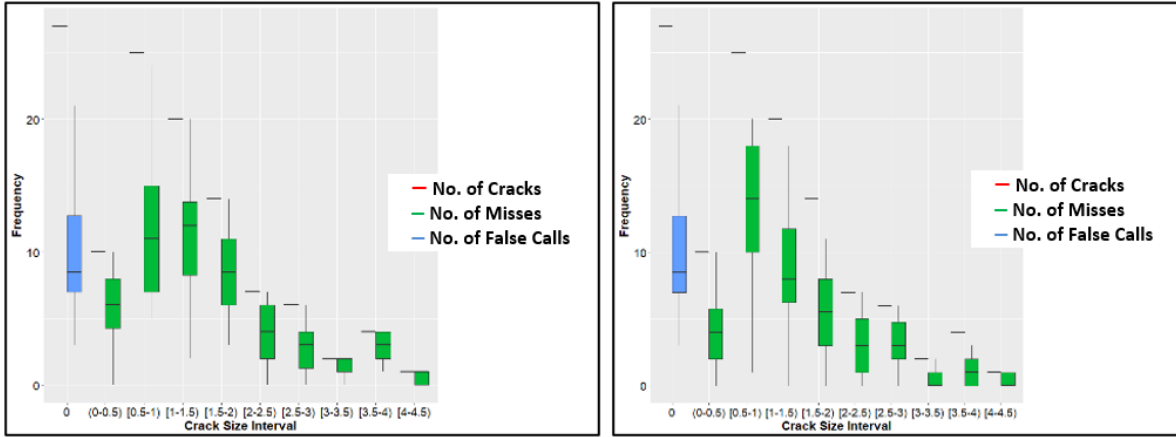


Figure 2. VT Box Plot Summary for FW Panels

Penetrant Testing (PT)

Figure 3 is the distribution of the frequency of number of observations, median number of hits and misses, and median of false calls for PT method and a crack size interval of 0.5 inches. Researchers presented the POH based on the relative frequency of hits per crack size interval. From the figure, note that the number of false calls is only shown in the 0-inch crack size interval and the 0.5- to 1-inch interval presents the highest number of hits and misses, and in all intervals the number of hits was greater than the number of misses.

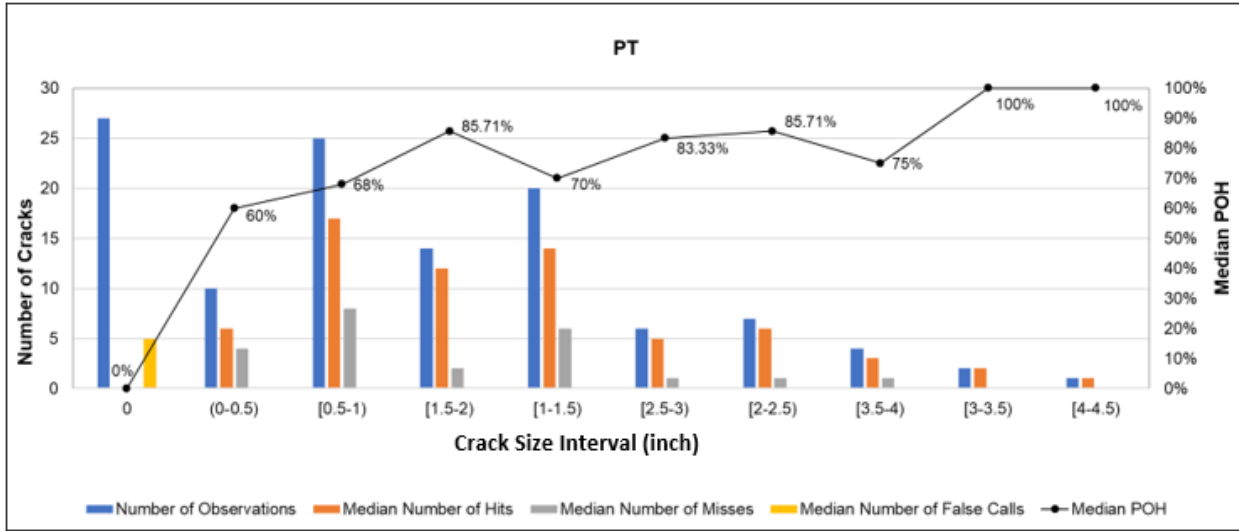


Figure 3. PT Summary for FW Panels

Figure 4 is the box plot for the frequency of the number of cracks, hits, misses, and false calls per crack size interval. The figure shows that 0.5- to 1-inch and 1- to 1.5-inch crack size intervals show the highest variability in the data.

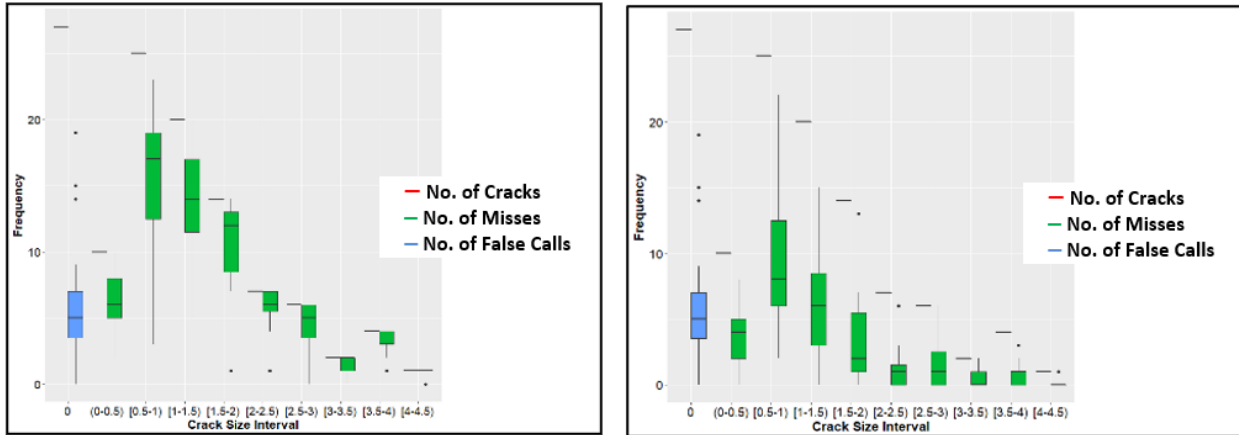


Figure 4. PT Box Plot Summary for FW Panels

Magnetic Particle Testing (MT) with Contrast

Figure 5 is the distribution of the frequency of number of observations, median number of hits and misses, and median of false calls for MT with contrast method and a crack size interval of 0.5-inches. In addition, researchers presented the POH based on the relative frequency of hits per crack size interval. From the figure, note that the number of false calls is only shown in the 0-inch crack size interval and it has a higher number of false calls compared to the previous two inspection methods. Additionally, the 0.5- to 1-inch interval presents the highest number of hits and misses and this method has a lower probability of misses compared to the previous two methods.

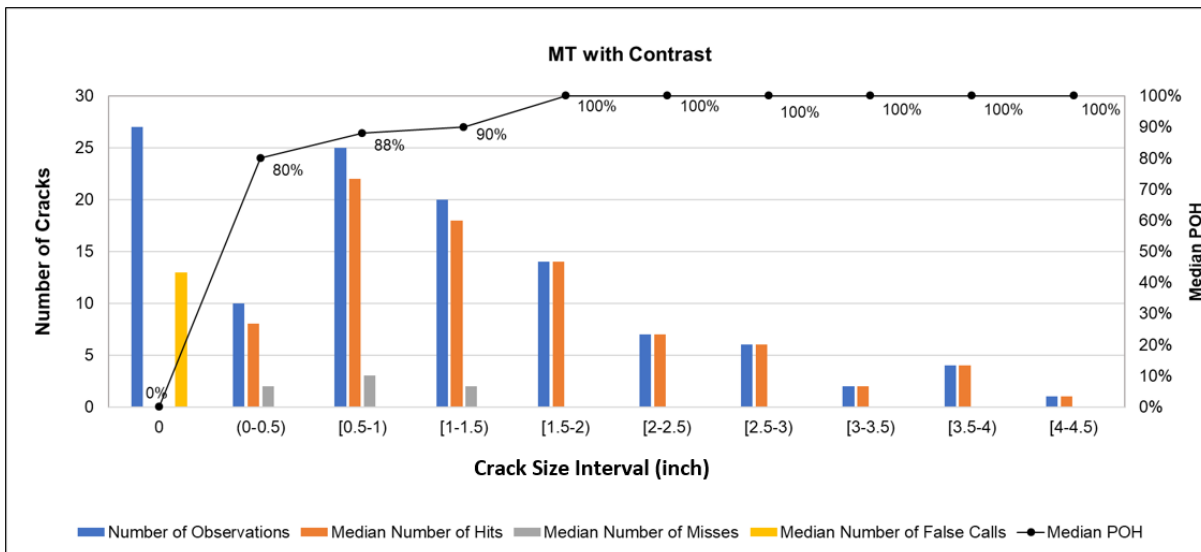


Figure 5. MT with Contrast Summary for FW Panels

Figure 6 is the box plot for the frequency of the number of cracks, hits, misses and false calls per crack size interval. The figure shows that 0.5- to 1-inch crack size interval show the highest variability in the data. In addition, there are outstanding data points outside the lower and upper whiskers for hits and misses respectively. These outstanding data points might be interpreted as an indication of potential outliers in the frequency of hits and misses for this inspection method.

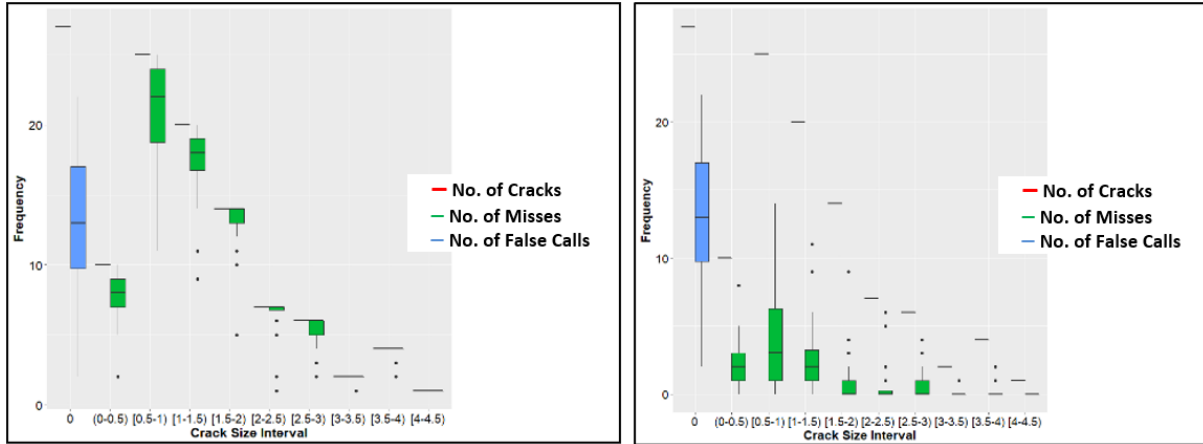


Figure 6. MT with Contrast Box Plot Summary for FW Panels

Magnetic Particle Testing Without Contrast

Figure 7 is the distribution of the frequency of number of observations, median number of hits and misses, and median of false calls for MT without contrast method and a crack size interval of 0.5-inches. In addition, researchers presented the POH based on the relative frequency of hits per crack size interval. From the figure, note that the number of false calls is only shown in the 0-inch crack size interval and it has a higher number of false calls compared to the previous two inspection methods. Additionally, the 0.5- to 1-inch interval presents the highest number of hits and misses and this method has lower probability of misses compared to the previous two methods. There were no misses reported in crack size intervals greater than or equal to 1.5-inches.

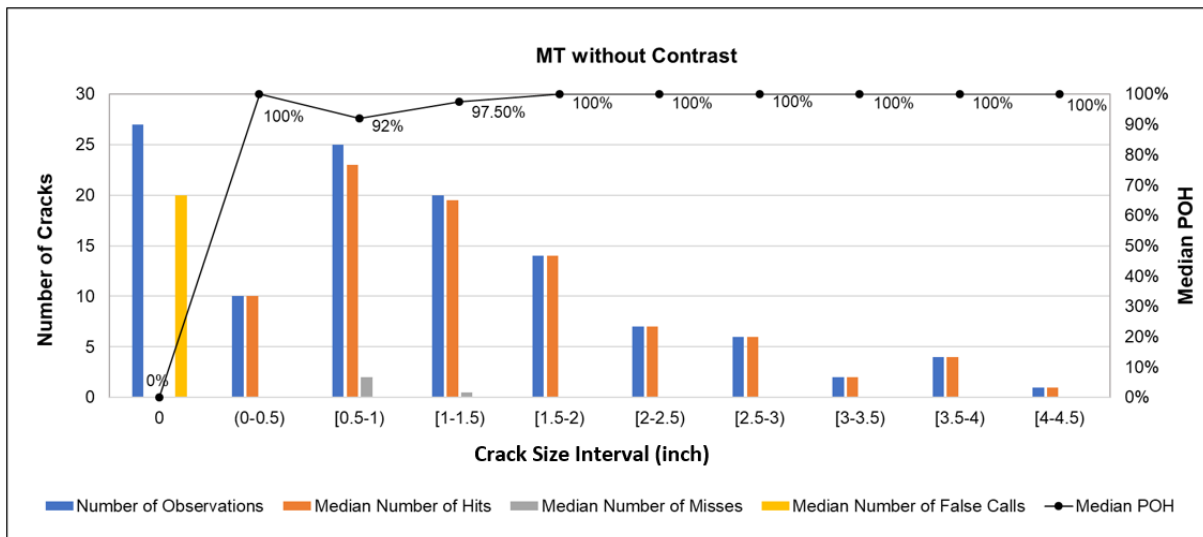


Figure 7. MT without Contrast Summary for FW Panels

Figure 8 is the box plot for the frequency of the number of cracks, hits, misses and false calls per crack size interval. The figure shows that 0.5- to 1-inch crack size interval shows the highest variability in the data. In addition, there are outstanding data points outside the lower and upper whiskers for hits and misses respectively. These outstanding data points might be interpreted as an indication of potential outliers in the frequency of hits and misses for this inspection method.

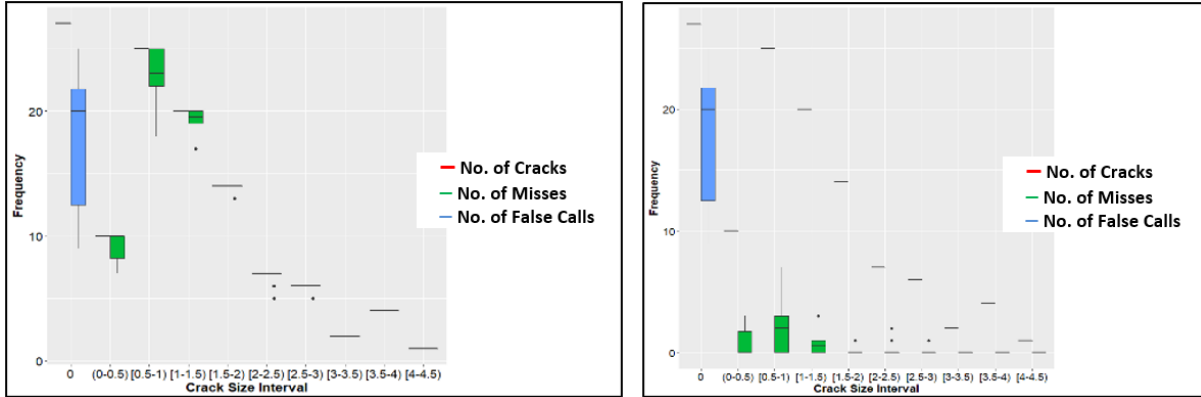


Figure 8. MT without Contrast Box Plot Summary for FW Panels

Ultrasonic Testing (UT)

Figure 9 is the distribution of the frequency of number of observations, median number of hits and misses, and median of false calls for the UT method and a crack size interval of 0.5-inches. Researchers presented the POH based on the relative frequency of hits per crack size interval. From the figure, note that the number of false calls is only shown in the 0-inch crack size interval. Additionally, the 0.5- to 1-inch interval presents the highest number of hits compared to the other crack size intervals.

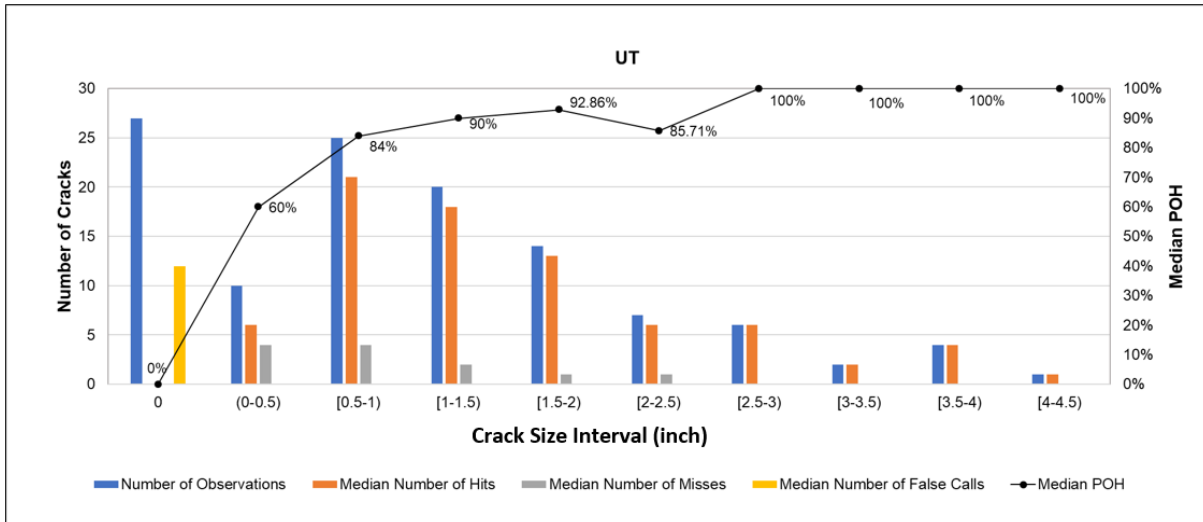


Figure 9. UT Summary for FW Panels

Figure 10 is the box plot for the frequency of the number of cracks, hits, misses and false calls per crack size interval. The figure shows that the 0.5- to 1-inch crack size interval shows the highest variability in the data. However, the variability in the data is smaller compared to the previous inspection methods.

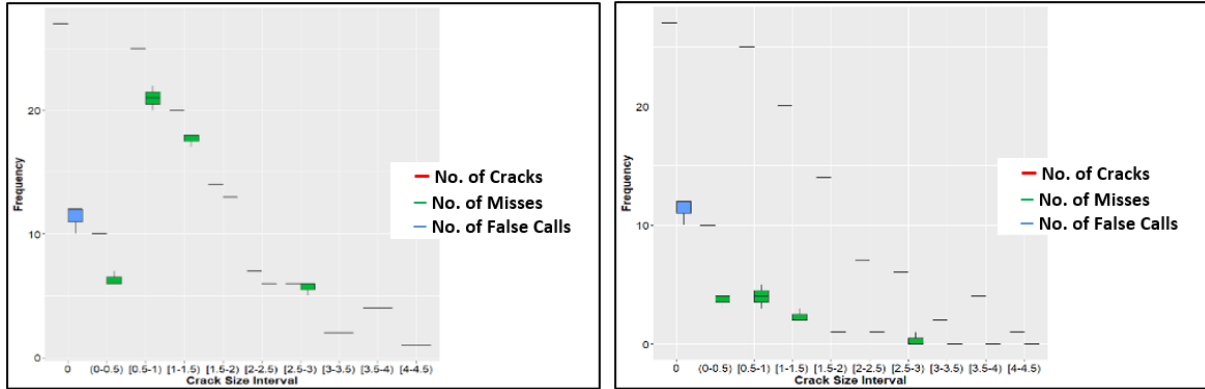


Figure 10. UT Box Plot Summary for FW Panels

Appendix B. Traditional Statistics POD Summary Graphs – Butt Welds

This appendix presents the summary of the median frequency of hits and misses for the distribution of cracks in butt welds (BW) for all operators and for each NDE method applied. An estimation of POH are also calculated and displayed on top of the median number of hits for each crack distribution.

Again, another way to visualize the same traditional statistics data for BW is using box plots. The box plot is a graphical method that allows data visualization by using various summary numbers: first quartile (or 25th percentile), median, third quartile (or 75th percentile), and minimum, maximum (based on the interquartile range). Depending on the data, potential outliers (data points outside the minimum and maximum) can be visualized. In this case, the box plot showed the frequency of hits and misses in separate plots with the total number of cracks and the false calls. From the plots, crack size intervals of 0.5- to 1-inches and 1- to 1.5-inches have the largest frequency of cracks as well as the largest variability in the data as shown in the box plots.

Visual Testing (VT)

Figure 11 is the distribution of the frequency of number of observations, median number of hits and misses, and the VT method with a crack size interval of 0.5-inches. Researchers presented the POH based on the relative frequency of hits per crack size interval. From the figure, note that the number of hits for a crack size interval less than 1-inch was less than the number of misses.

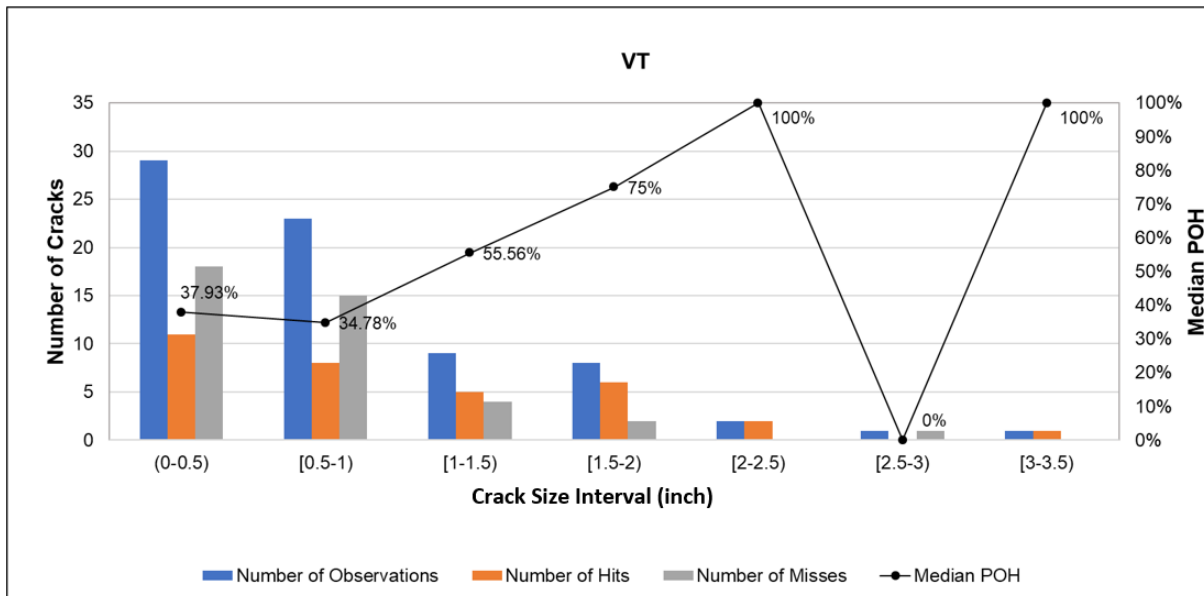


Figure 11. VT Summary for BW Panels

Figure 12 is the box plot for the frequency of the number of cracks, hits and misses per crack size interval, and the median number of false calls. The figure shows that the 0 to 0.5-inch crack size interval shows the highest variability in the data. In addition, there are outstanding data points outside the lower and upper whiskers in the 3- to 3.5-inch interval for hits and misses,

respectively. These outstanding data points might be interpreted as an indication of potential outliers in the frequency of hits and misses for this inspection method.

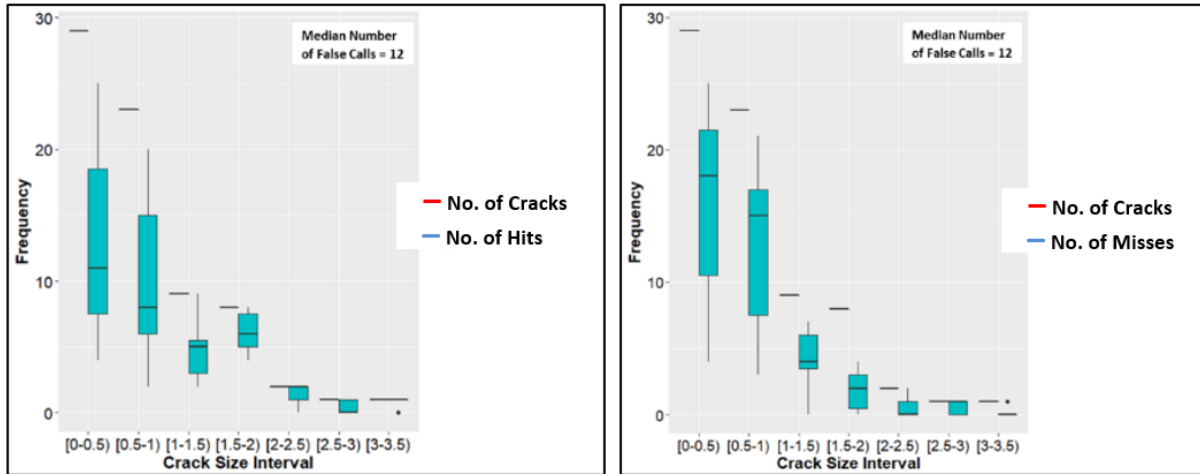


Figure 12. VT Box Plot Summary for BW Panels

Penetrant Testing (PT)

Figure 13 is the distribution of the frequency of number of observations, median number of hits and misses, and the VT method with a crack size interval of 0.5-inches. Researchers presented the POH based on the relative frequency of hits per crack size interval. From the figure, note that the number of hits for crack size interval less than 0.5-inches was less than the number of misses. There were no misses found for crack size intervals of 2- to 2.5-inches and 3- to 3.5-inches.

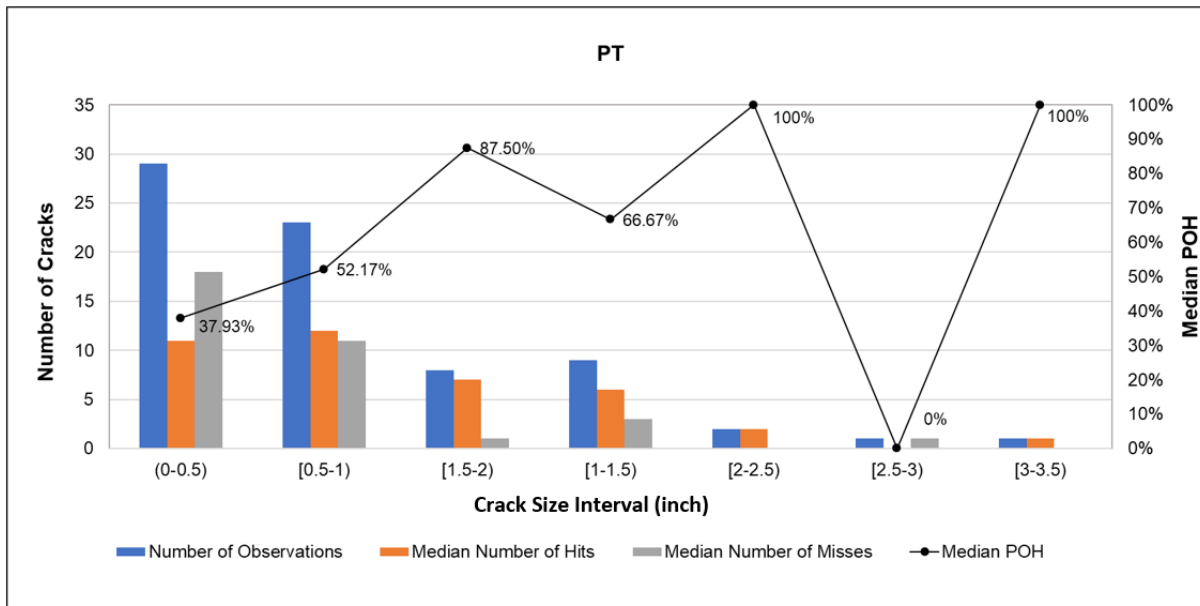


Figure 13. PT Summary for BW Panels

Figure 14 is the box plot for the frequency of the number of cracks, hits and misses per crack size interval, and the median number of false calls. The figure shows that the 0.5- to 1-inch crack

size interval shows the highest variability in the data. In addition, there are outstanding data points outside the lower and upper whiskers for hits and misses, respectively. These outstanding data points might be interpreted as indication of potential outliers in the frequency of hits and misses for this inspection method.

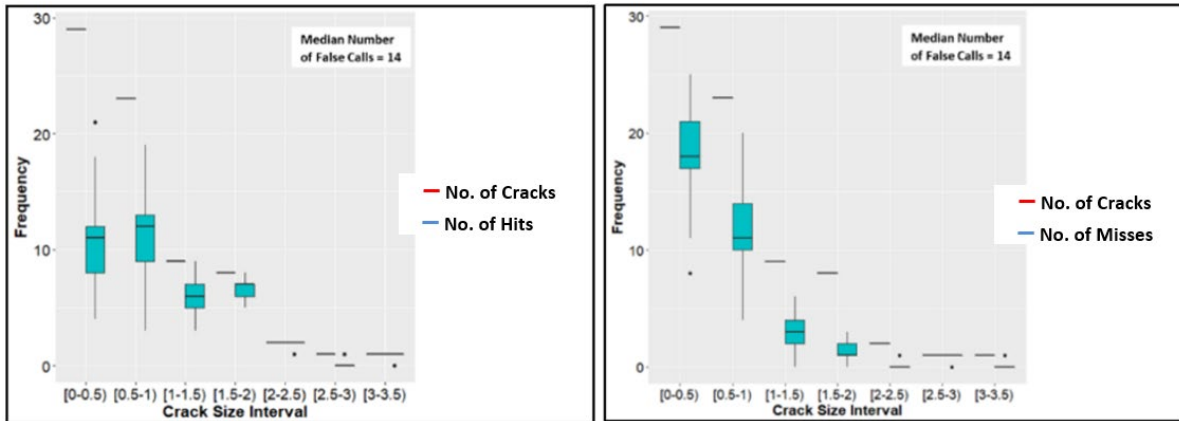


Figure 14. PT Box Plot Summary for BW Panels

Magnetic Particle Testing (MT) with Contrast

Figure 15 is the distribution of the frequency of number of observations, median number of hits and misses, and MT with contrast method with a crack size interval of 0.5-inch. Researchers presented the POH based on the relative frequency of hits per crack size interval. From the figure, note that the crack size interval of 0 to 0.5-inches has the highest number of hits and misses. There were not misses found for crack sizes greater than or equal to 2 inches.

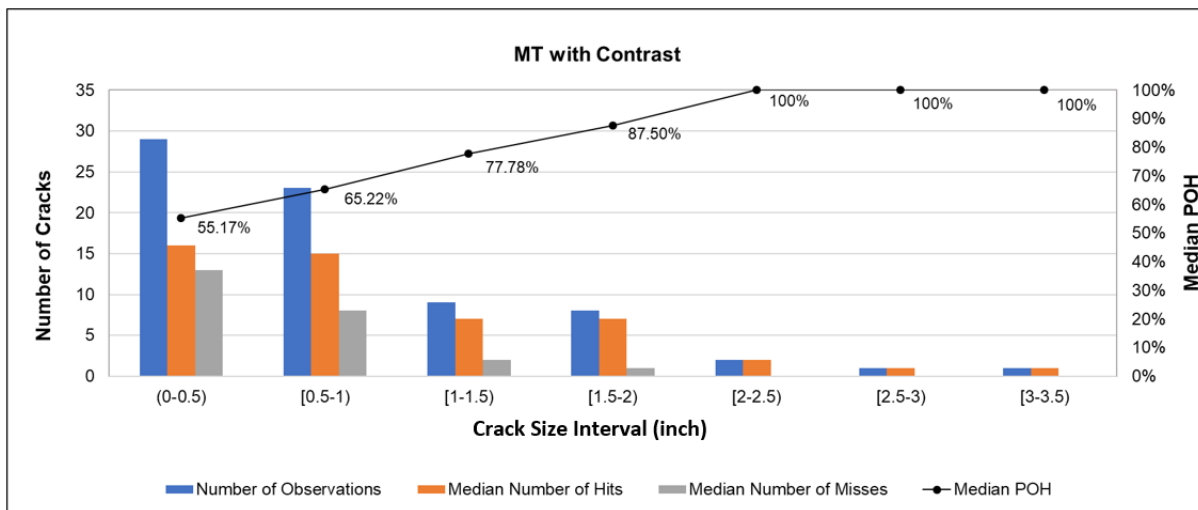


Figure 15. MT with Contrast Summary for BW Panels

Figure 16 is the box plot for the frequency of the number of cracks, hits and misses per crack size interval, and the median number of false calls. The figure shows that 0 to 0.5-inch crack size interval shows the highest variability in the data. In addition, there are outstanding data points outside the lower and upper whiskers for hits and misses, respectively. These outstanding data points might be interpreted as indication of potential outliers in the frequency of hits and misses for this inspection method.

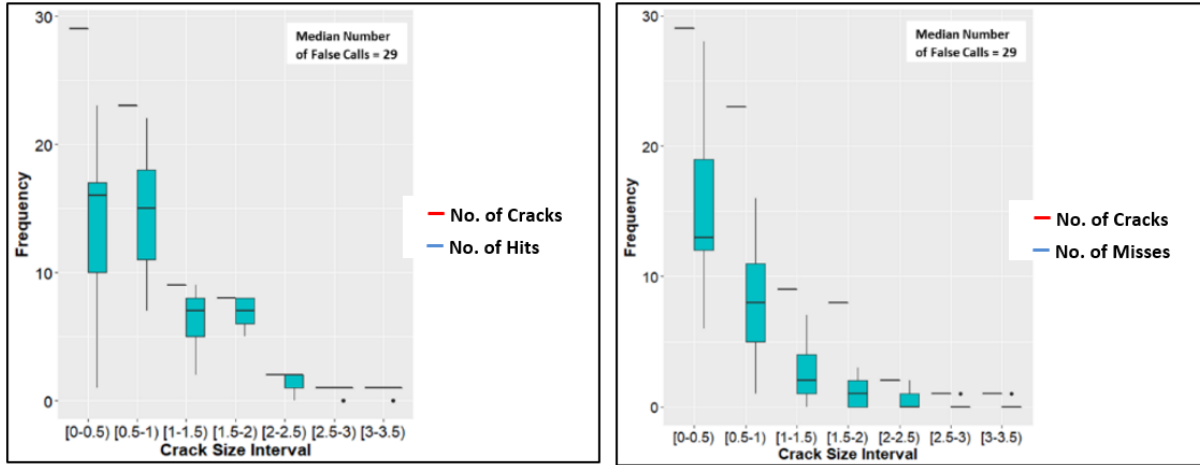


Figure 16. MT with Contrast Box Plot Summary for BW Panels

Magnetic Particle Testing (MT) Without Contrast

Figure 17 is the distribution of the frequency of number of observations, median number of hits and misses, and the MT without contrast method with a crack size interval of 0.5-inches. Researchers presented the POH based on the relative frequency of hits per crack size interval. From the figure, note that the crack size interval of 0 to 0.5-inch has the highest number of hits and misses. There were no misses found for crack sizes greater than or equal to 1.5-inches.

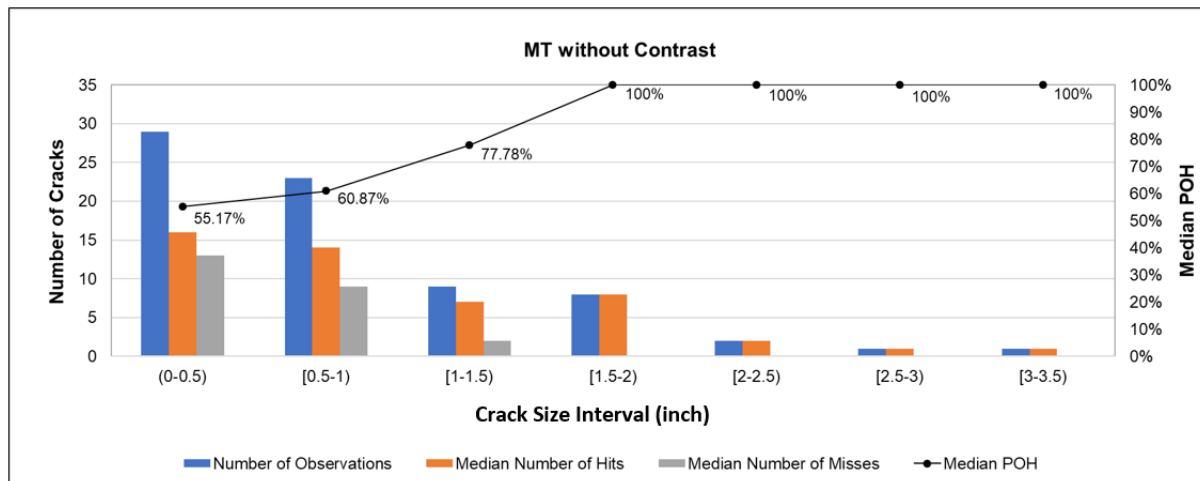


Figure 17. MT Without Contrast Summary for BW Panels

Figure 18 is the box plot for the frequency of the number of cracks, hits and misses per crack size interval, and the median number of false calls. The figure shows that the 0 to 0.5-inch crack size interval shows the highest variability in the data. In addition, there are outstanding data points outside the lower and upper whiskers for hits and misses, respectively. These outstanding data points might be interpreted as indication of potential outliers in the frequency of hits and misses for this inspection method.

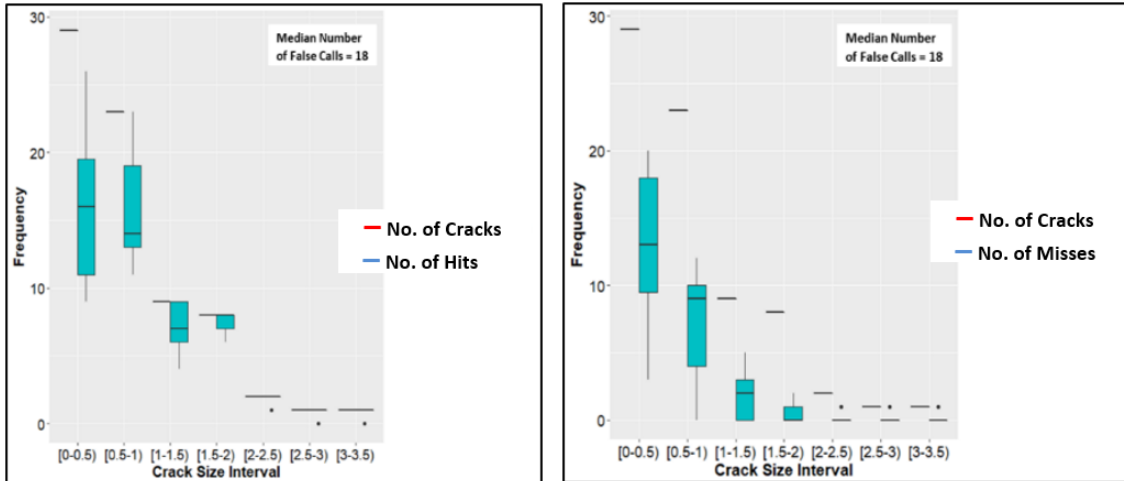


Figure 18. MT Without Contrast Box Plot Summary for BW Panels

Ultrasonic Testing (UT)

Figure 19 is the distribution of the frequency of number of observations, median number of hits and median number of misses for the UT method and a crack size interval of 0.5-inches. Researchers presented the POH based on the relative frequency of hits per crack size interval. From the figure, note that the crack size interval of 0 to 0.5-inches has the largest number of misses and the interval of 0.5 to 1-inches has the highest number of hits. There were no misses found for crack sizes greater than or equal to 2 inches.

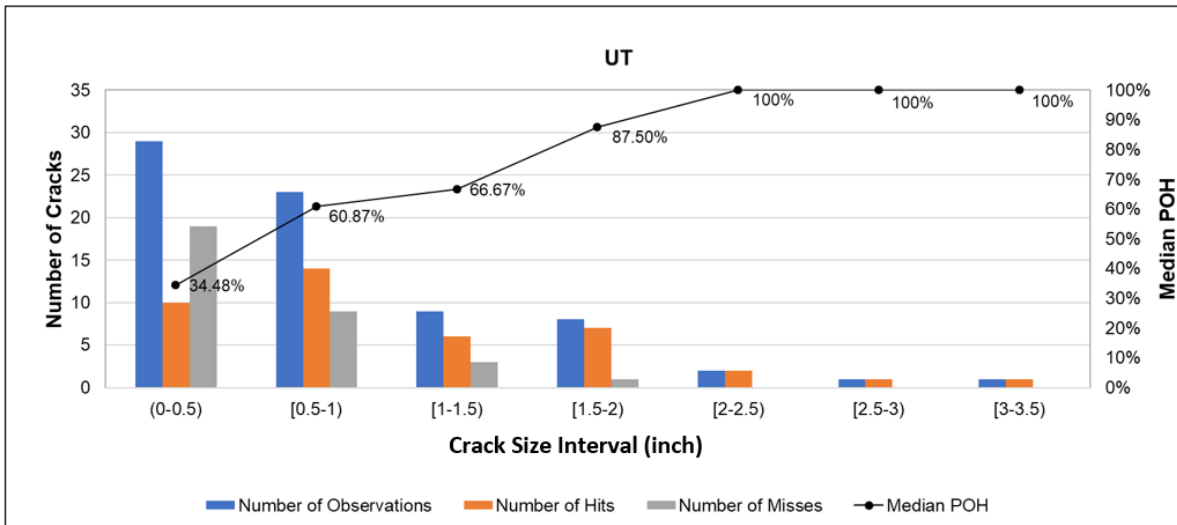


Figure 19. UT Summary for BW Panels

Figure 20 is the box plot for the frequency of number of cracks, hits, and misses per crack size interval, and the median number of false calls. The figure shows that a 0 to 0.5-inch crack size interval shows the highest variability in the data. In addition, there are outstanding data points outside the lower and upper whiskers for hits and misses, respectively. These outstanding data points might be interpreted as an indication of potential outliers in the frequency of hits and misses for this inspection method.

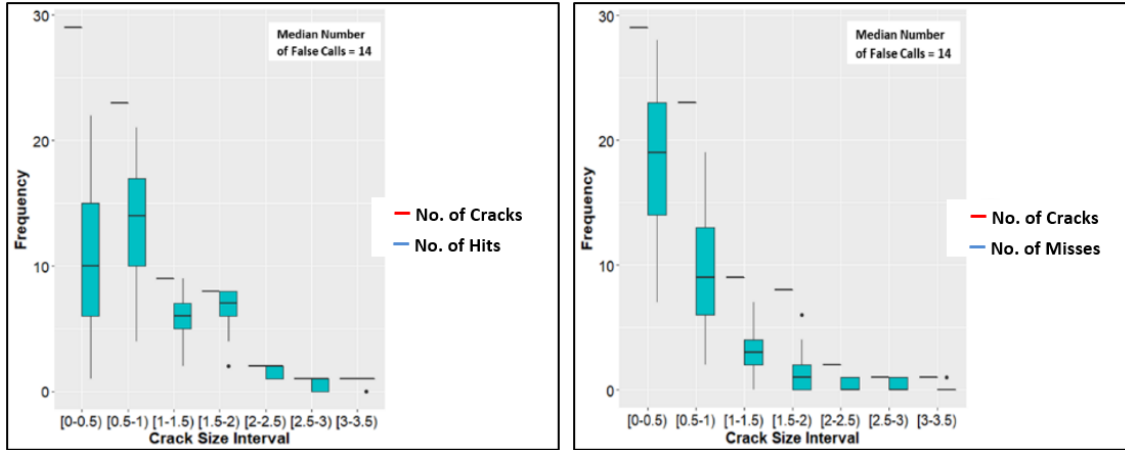


Figure 20. UT Box Plot Summary for BW Panels

Phased-Array Ultrasonic Testing (PAUT)

Figure 21 is the distribution of the frequency of number of observations, median number of hits and misses for the PAUT method and a crack size interval of 0.5-inches. Researchers presented the POH based on the relative frequency of hits per crack size interval. From the figure, note that the crack size interval of 0 to 0.5-inches has the highest number of misses and the interval of 0.5- to 1-inches has the highest number of hits. There were no misses found for crack sizes greater than or equal to 1.5-inch.

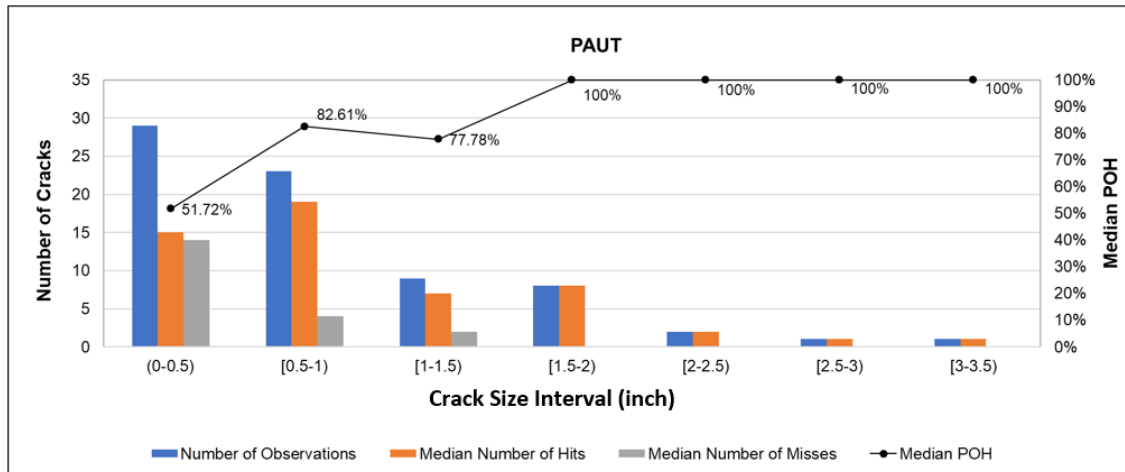


Figure 21. PAUT Summary for BW Panels

Figure 22 is the box plot for the frequency of the number of cracks, hits, and misses per crack size interval, and the median number of false calls. The figure shows that 0- to 0.5-inch and 0.5- to 1-inch crack size intervals show the highest variability in the data. In addition, there are outstanding data points outside the lower and upper whiskers for hits and misses, respectively. These outstanding data points might be interpreted as an indication of potential outliers in the frequency of hits and misses for this inspection method.

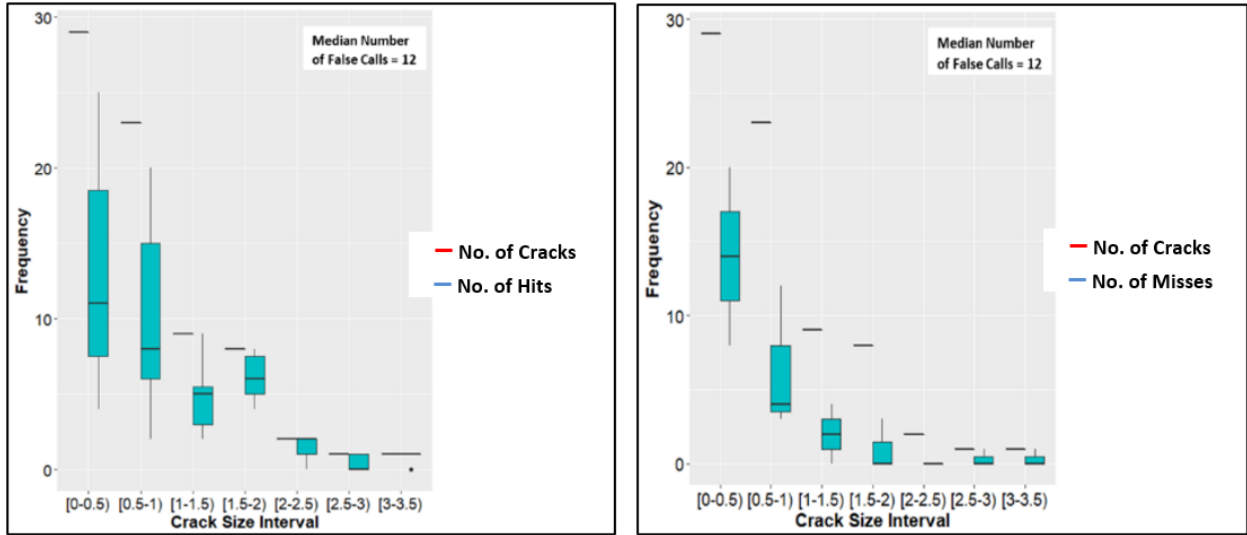


Figure 22. PAUT Box Plot Summary for BW Panels

Appendix C. Traditional Statistics POD Graphs for Individual Operator – Fillet Welds

This appendix shows statistical POD graphs for individual operator-fillet welds in [Figure 23](#) through [Figure 112](#).

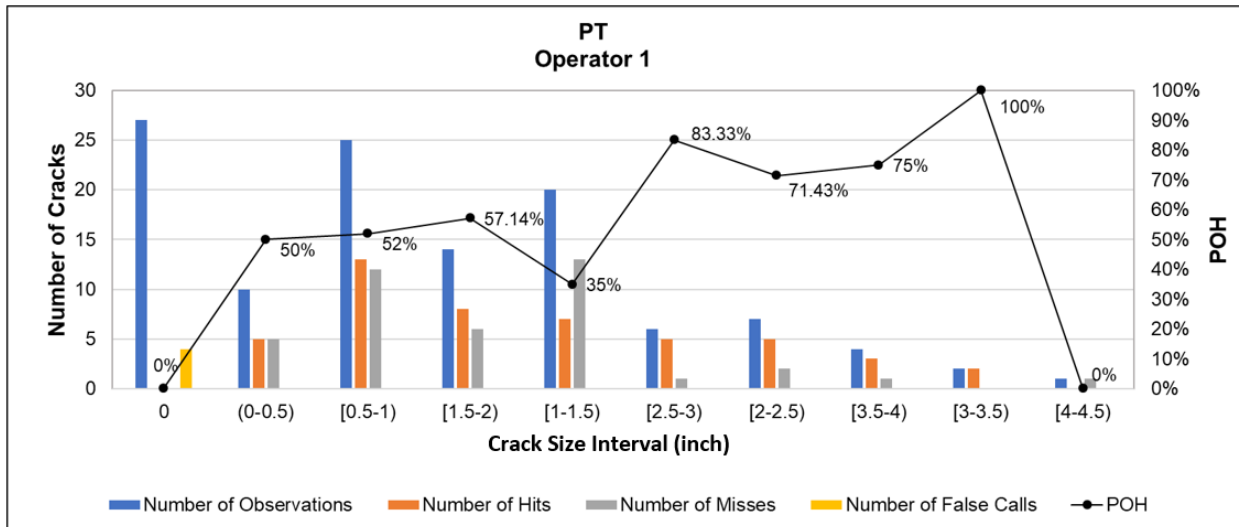


Figure 23. FW PT Distribution of Hits – Operator 1

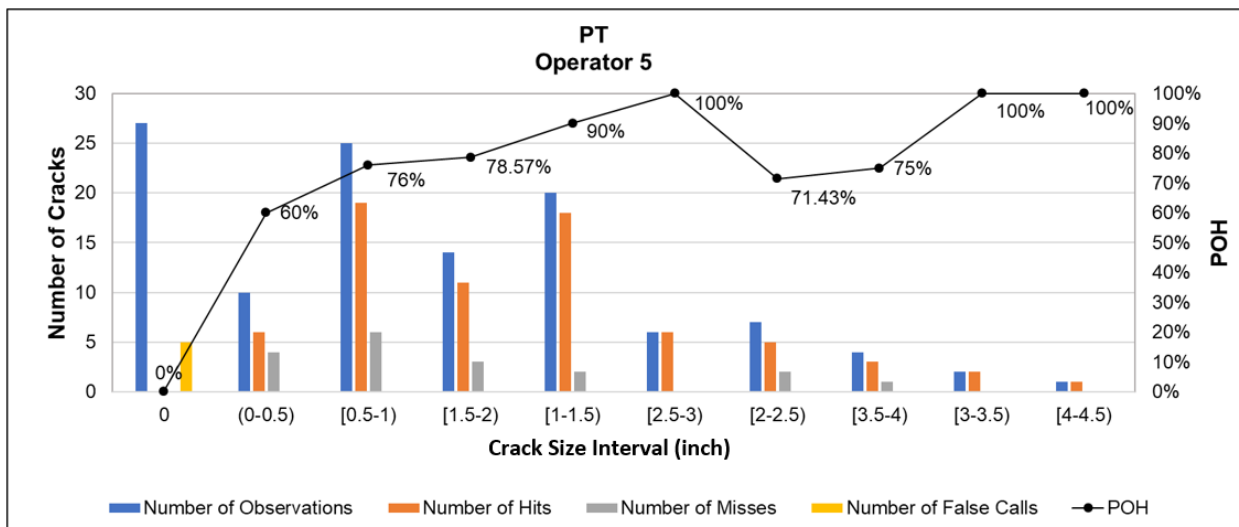


Figure 24. FW PT Distribution of Hits – Operator 5

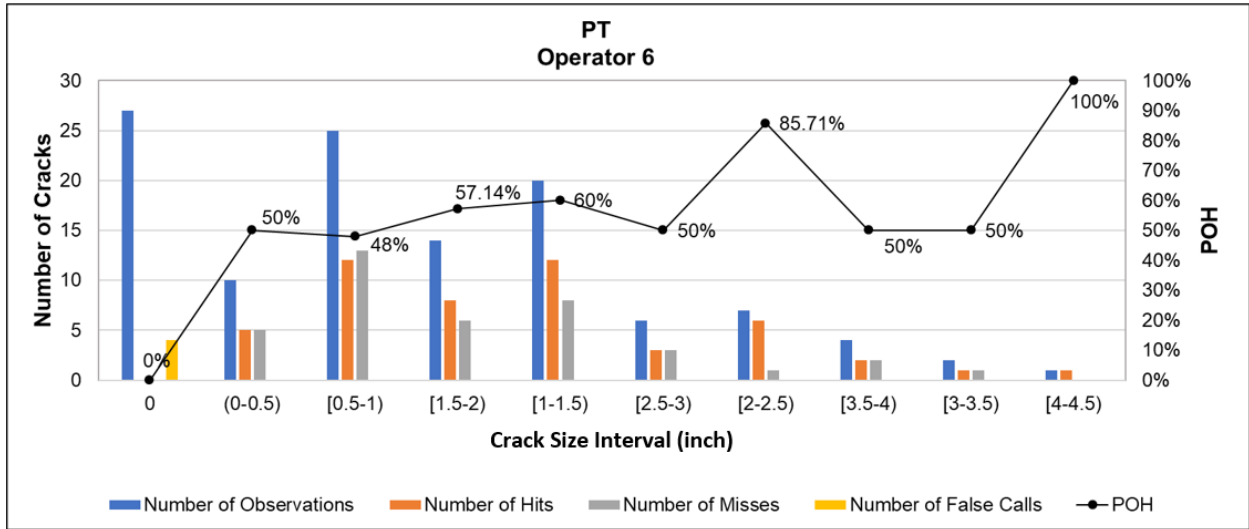


Figure 25. FW PT Distribution of Hits – Operator 6

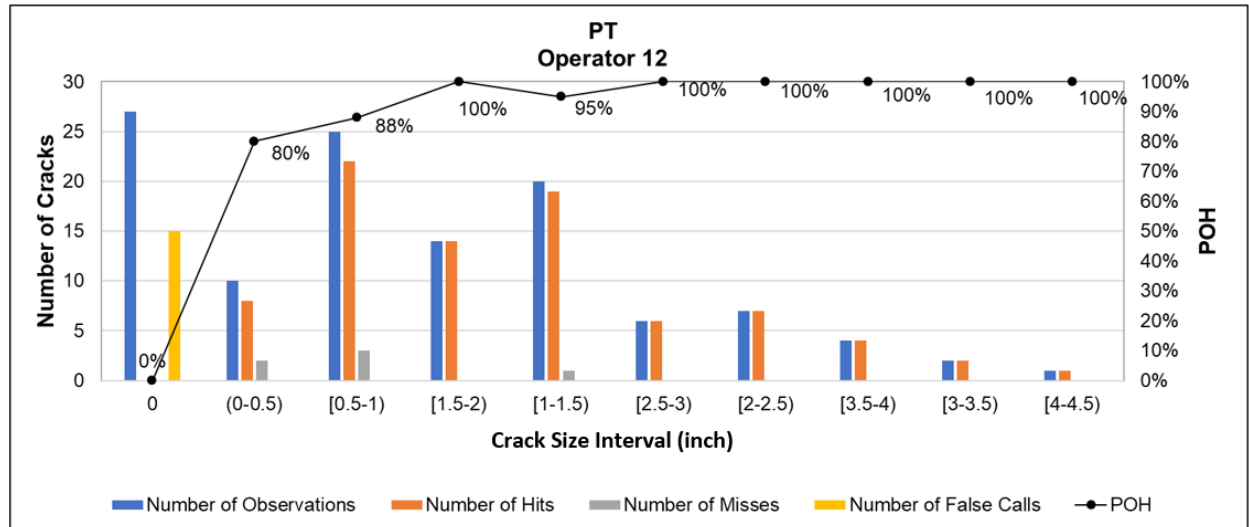


Figure 26. FW PT Distribution of Hits – Operator 12

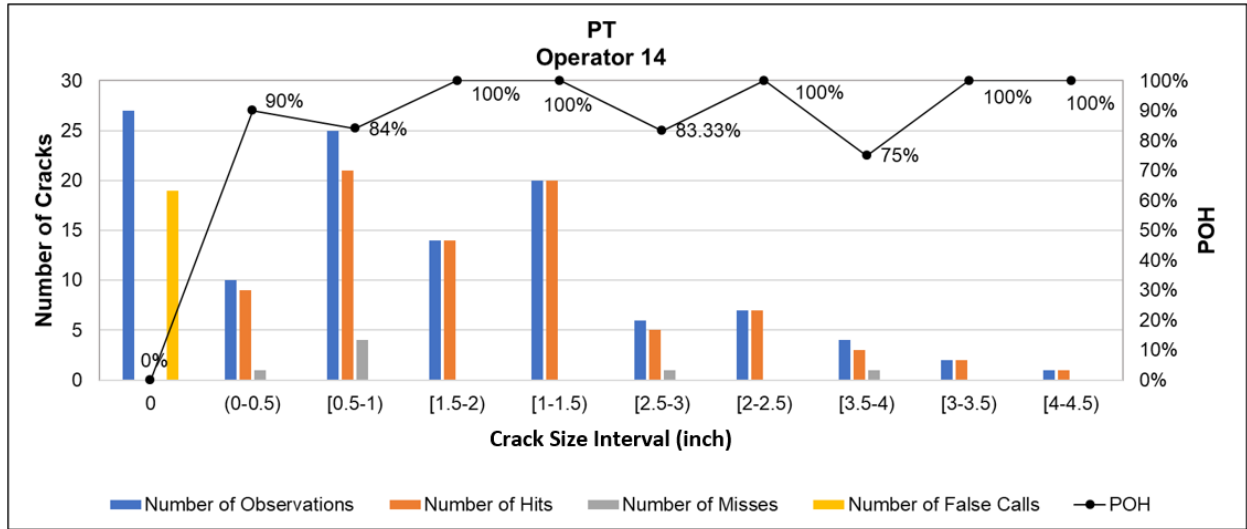


Figure 27. FW PT Distribution of Hits – Operator 14

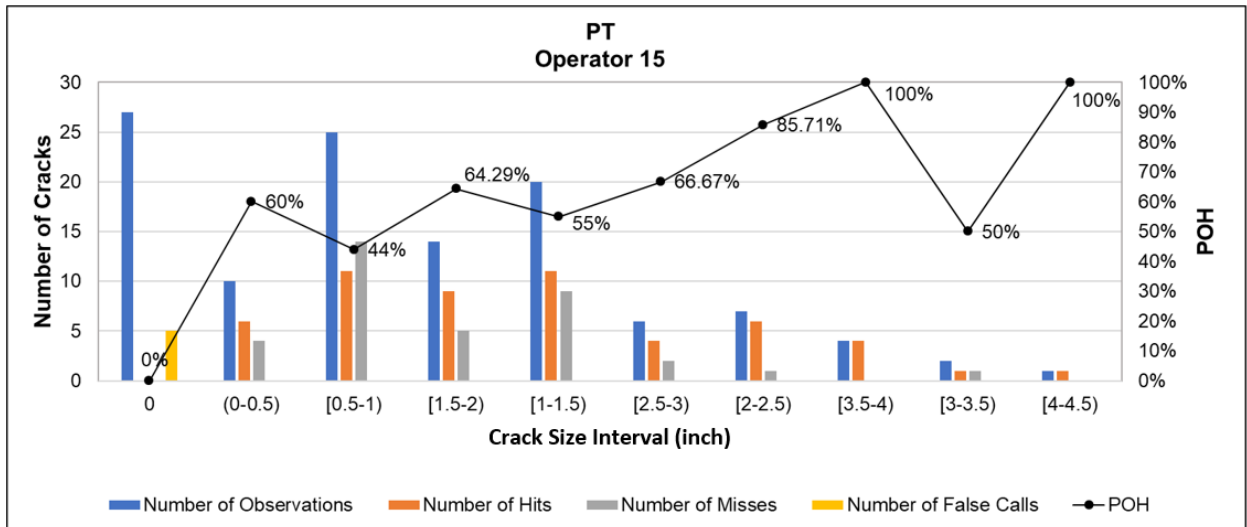


Figure 28. FW PT Distribution of Hits – Operator 15

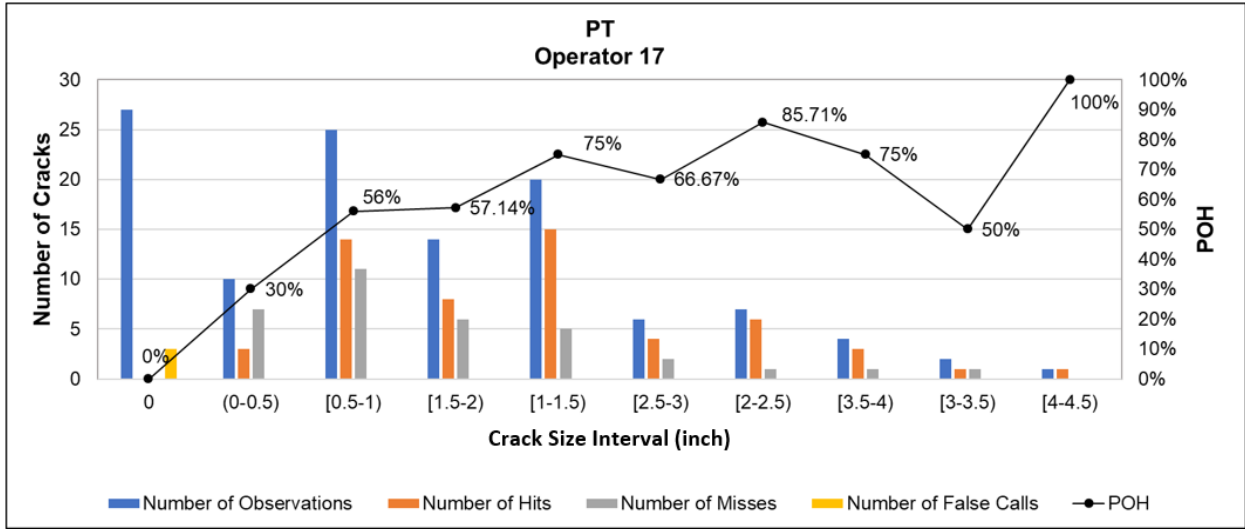


Figure 29. FW PT Distribution of Hits – Operator 17

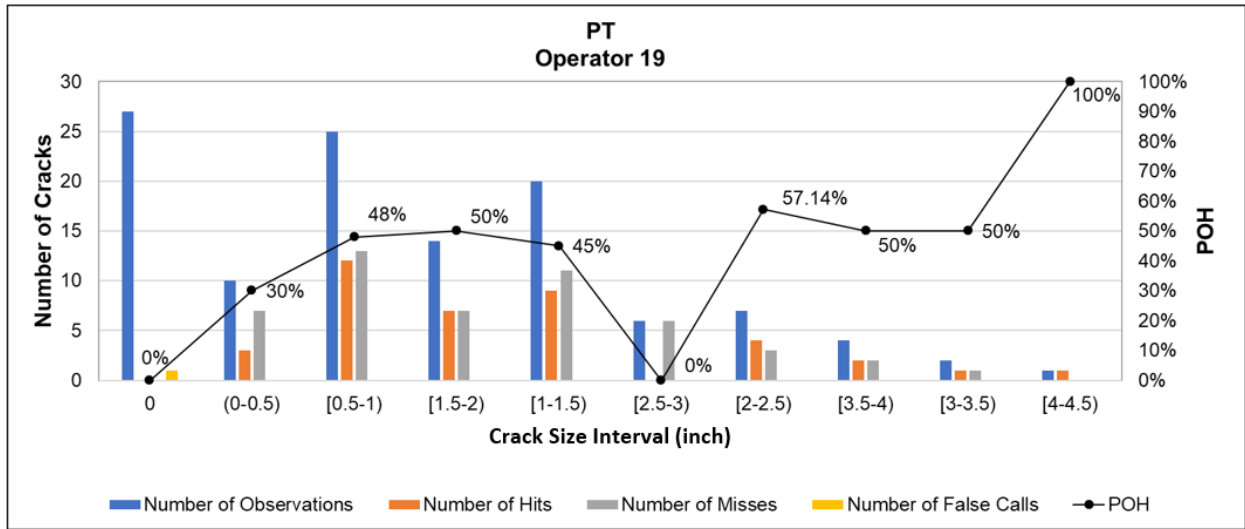


Figure 30. FW PT Distribution of Hits – Operator 19

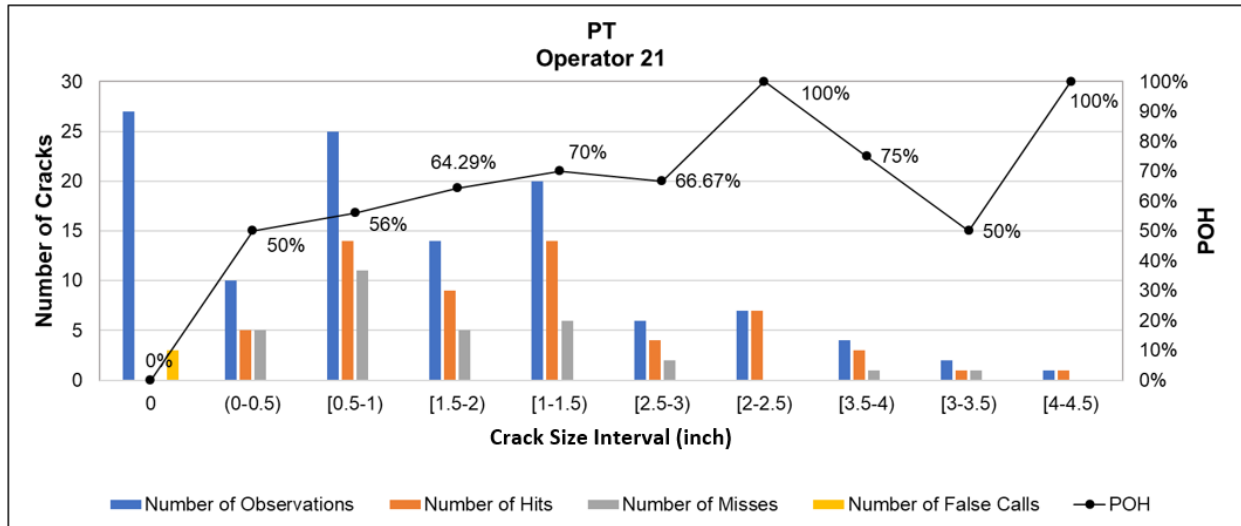


Figure 31. FW PT Distribution of Hits – Operator 21

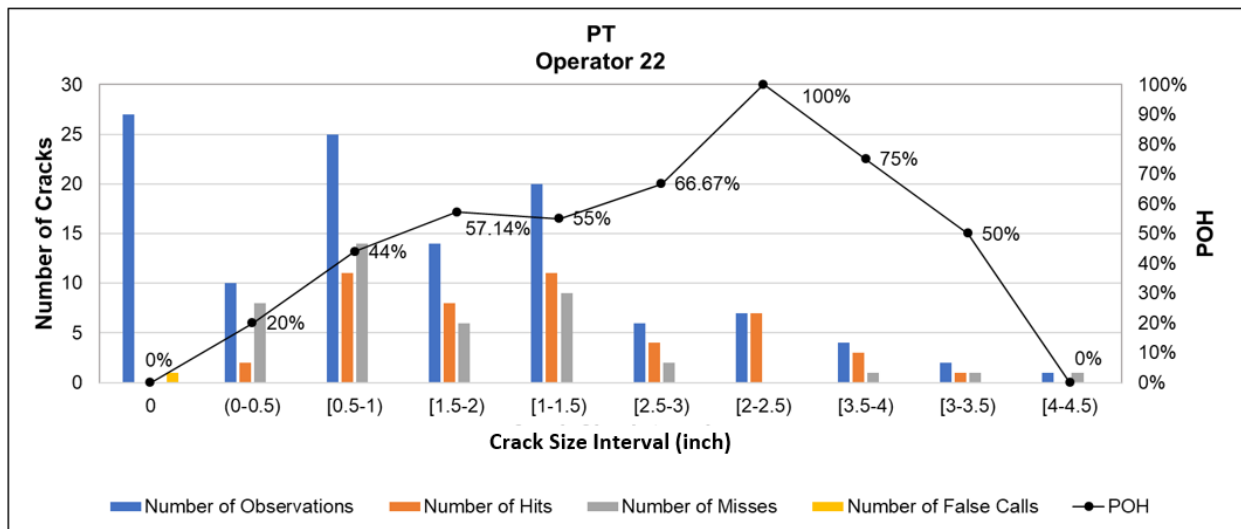


Figure 32. FW PT Distribution of Hits – Operator 22

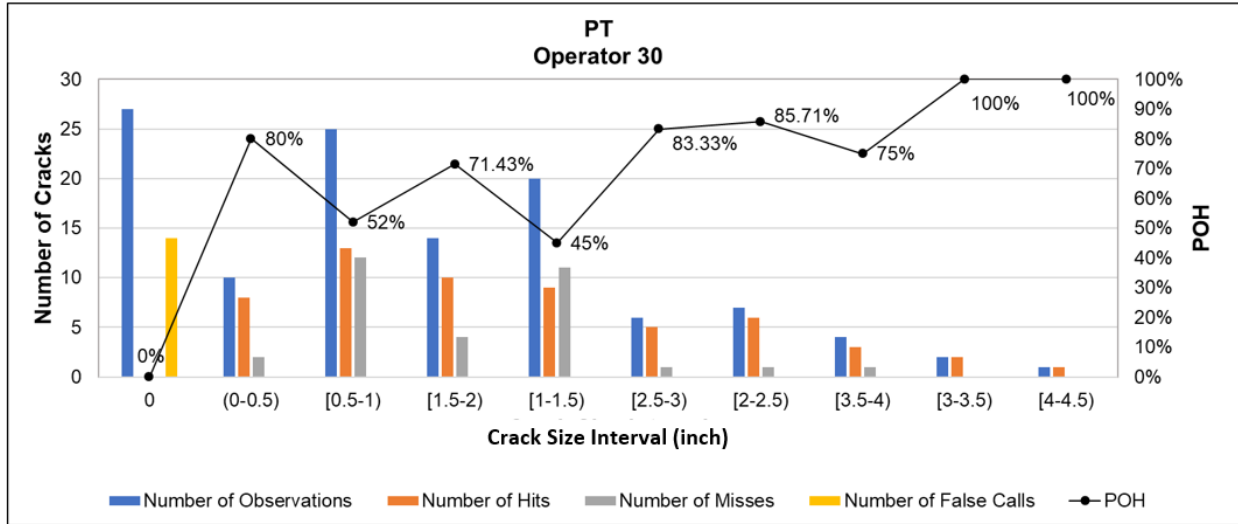


Figure 33. FW PT Distribution of Hits – Operator 30

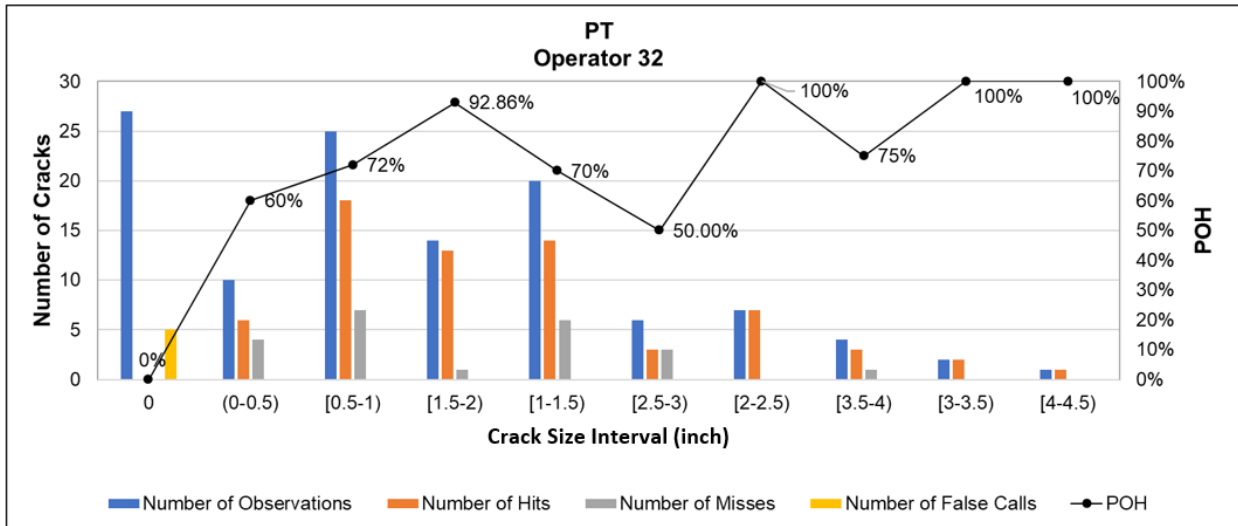


Figure 34. FW PT Distribution of Hits – Operator 32

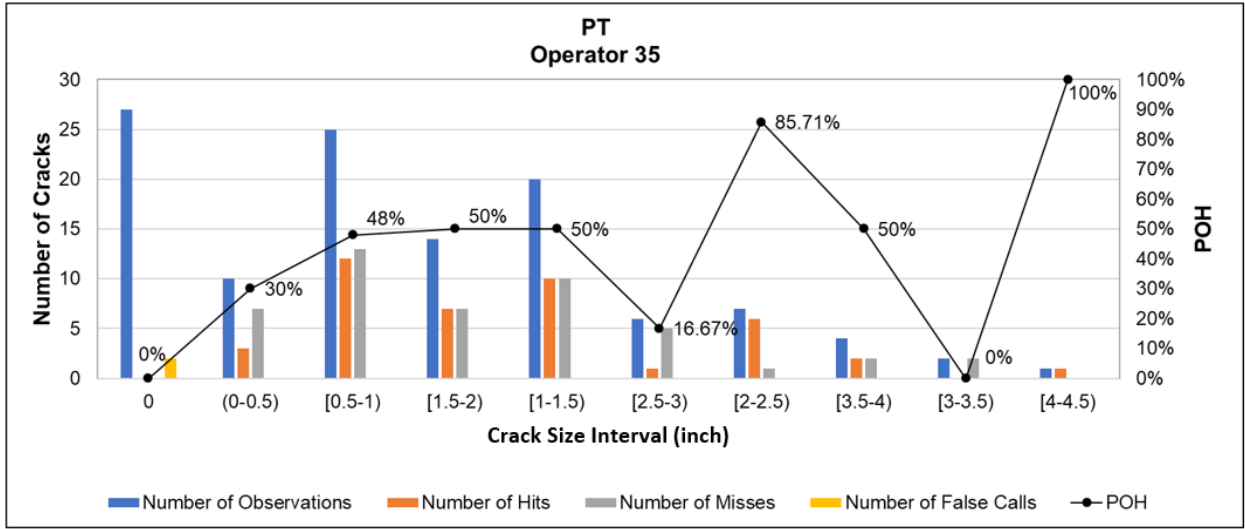


Figure 35. FW PT Distribution of Hits – Operator 35

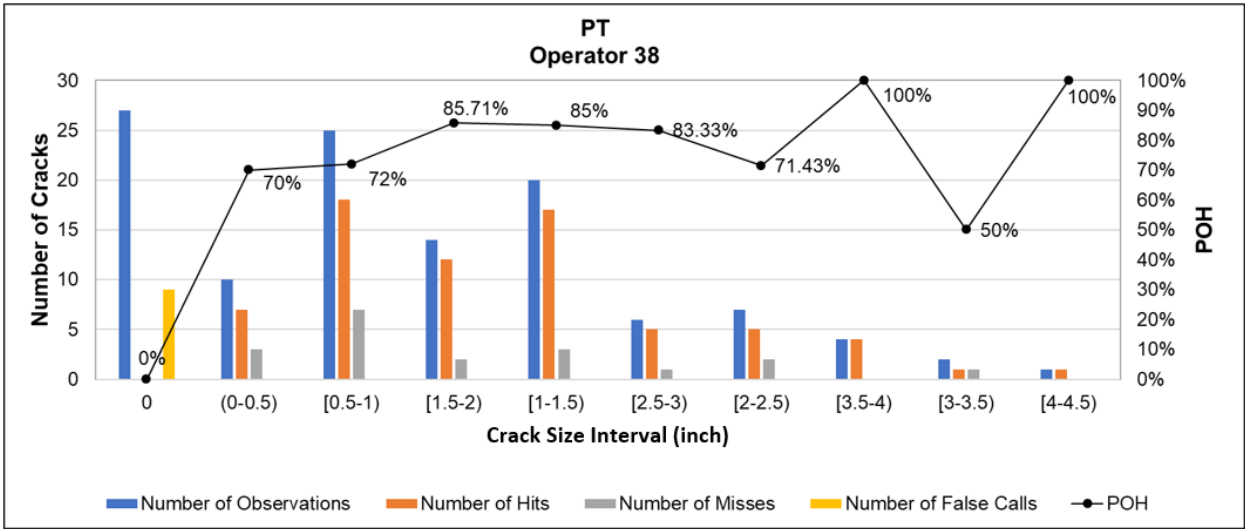


Figure 36. FW PT Distribution of Hits – Operator 38

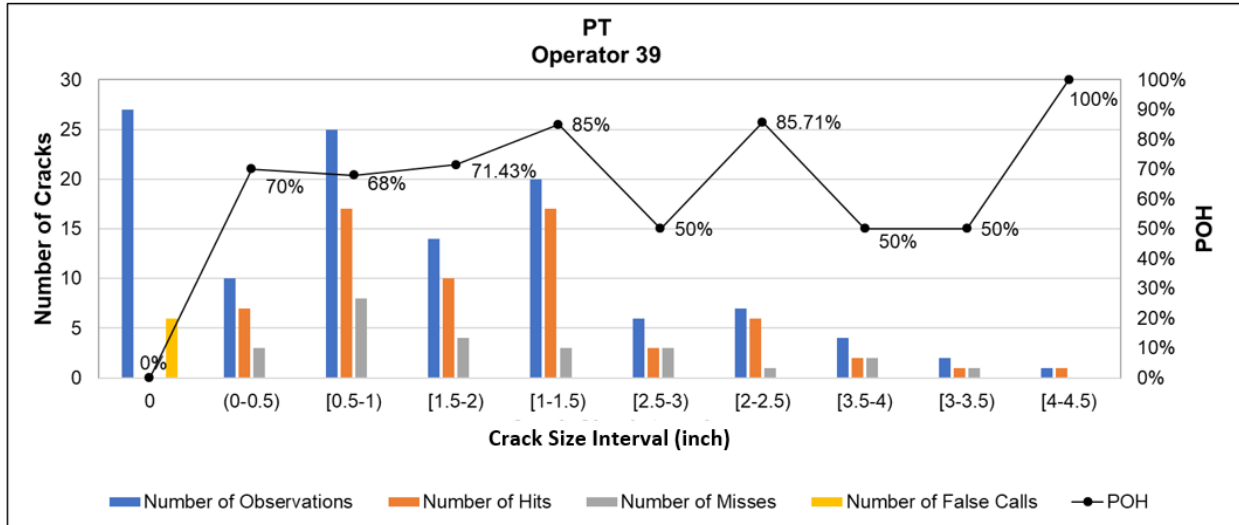


Figure 37. FW PT Distribution of Hits – Operator 39

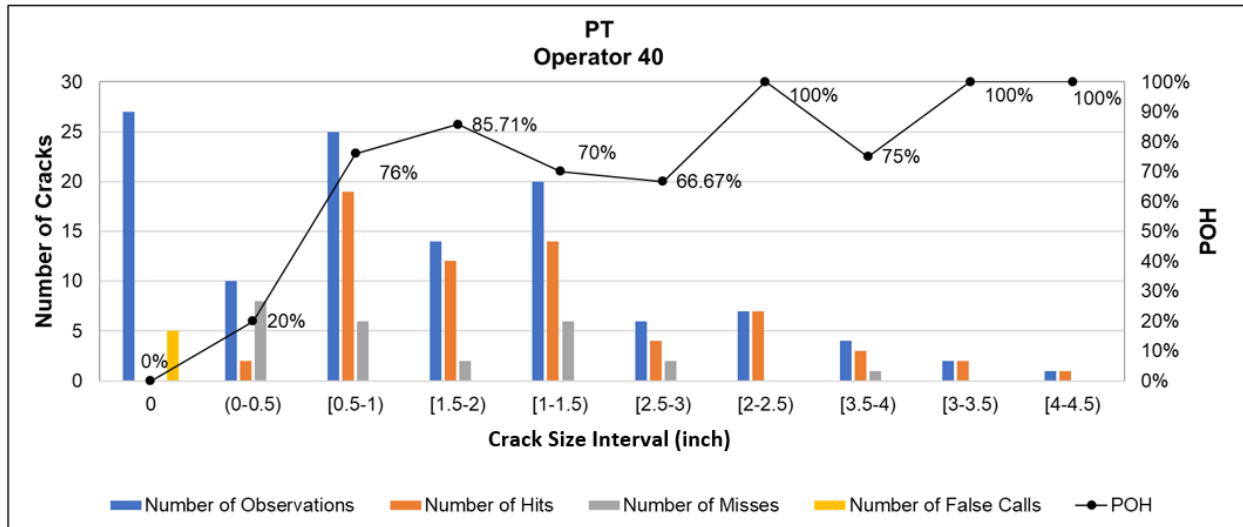


Figure 38. FW PT Distribution of Hits – Operator 40

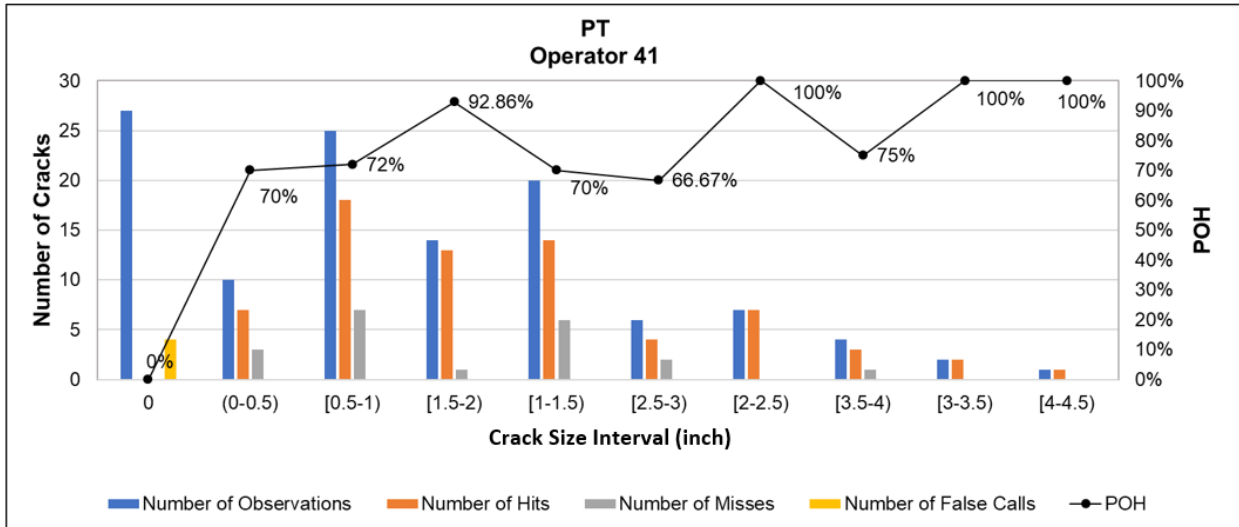


Figure 39. FW PT Distribution of Hits – Operator 41

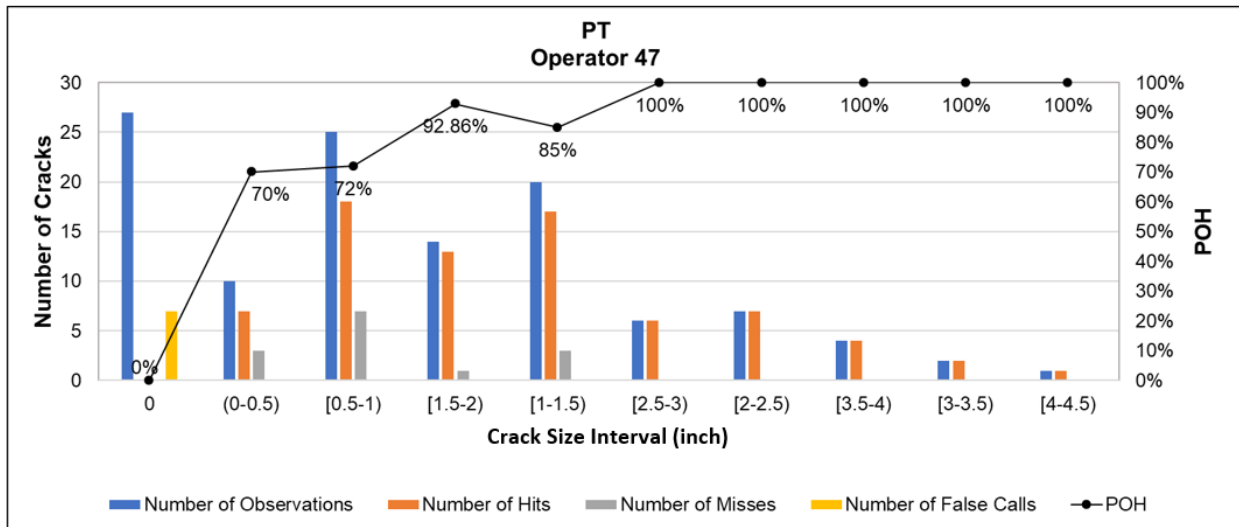


Figure 40. FW PT Distribution of Hits – Operator 47

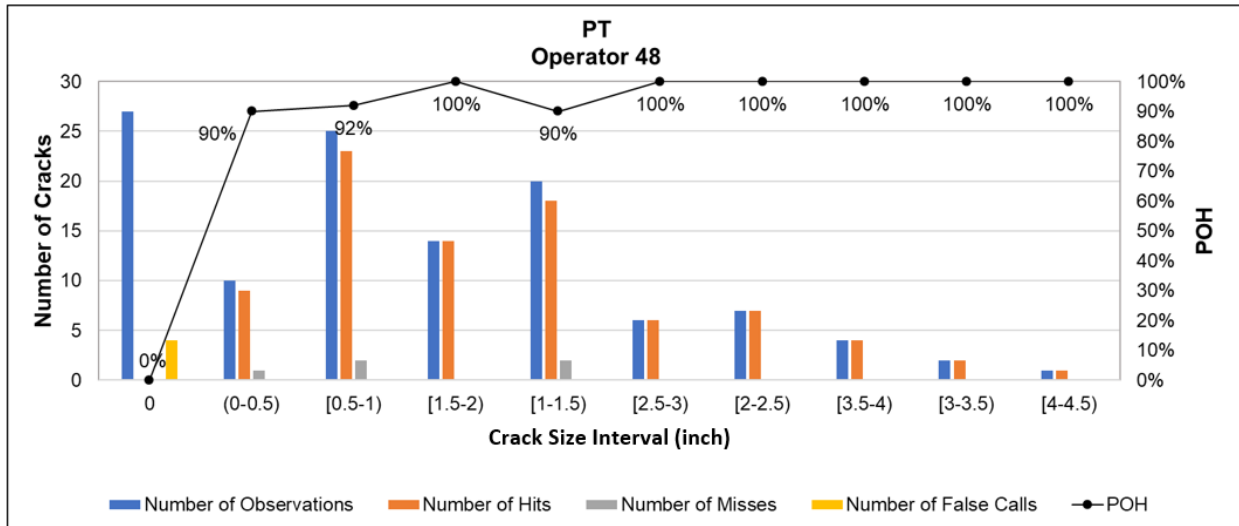


Figure 41. FW PT Distribution of Hits – Operator 48

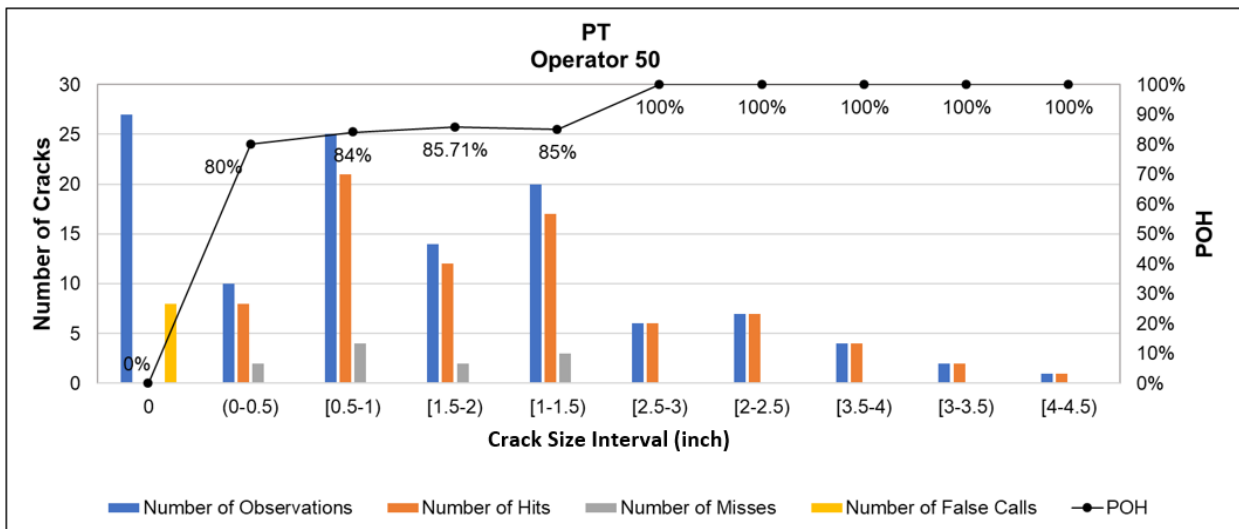


Figure 42. FW PT Distribution of Hits – Operator 50

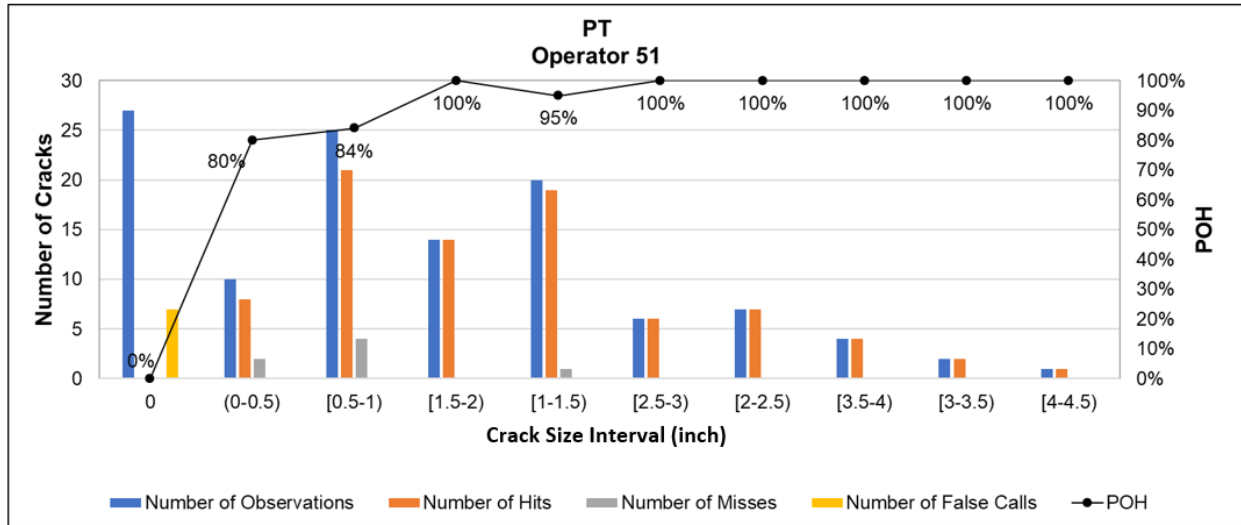


Figure 43. FW PT Distribution of Hits – Operator 51

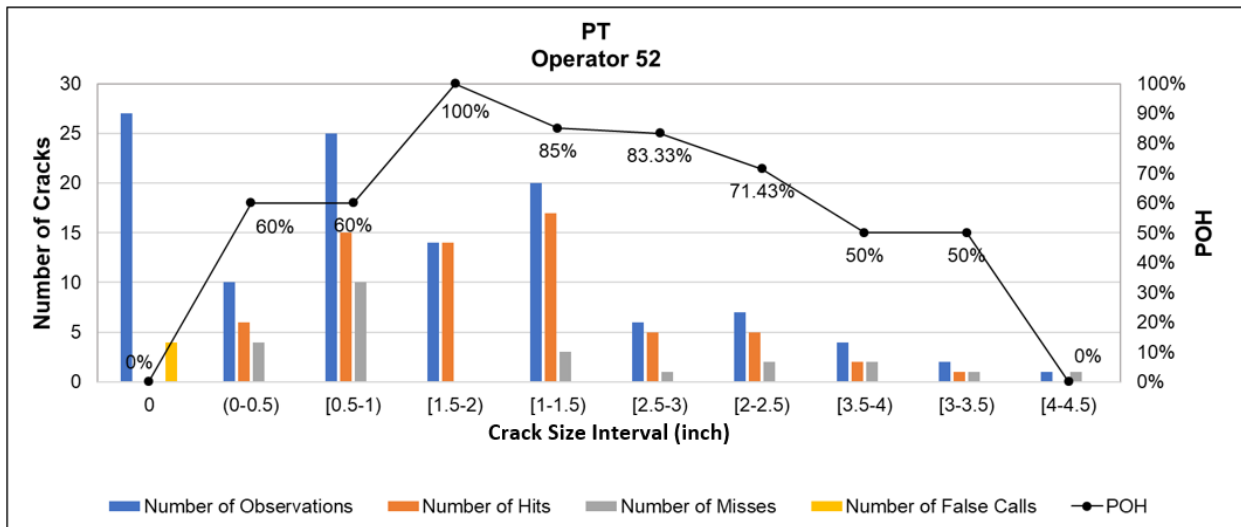


Figure 44. FW PT Distribution of Hits – Operator 52

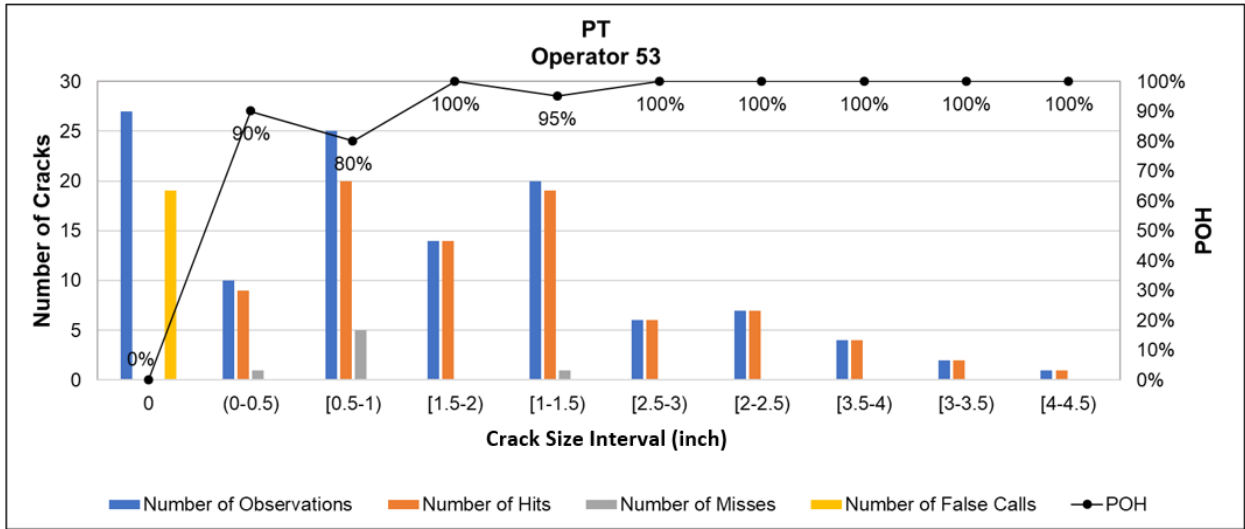


Figure 45. FW PT Distribution of Hits – Operator 53

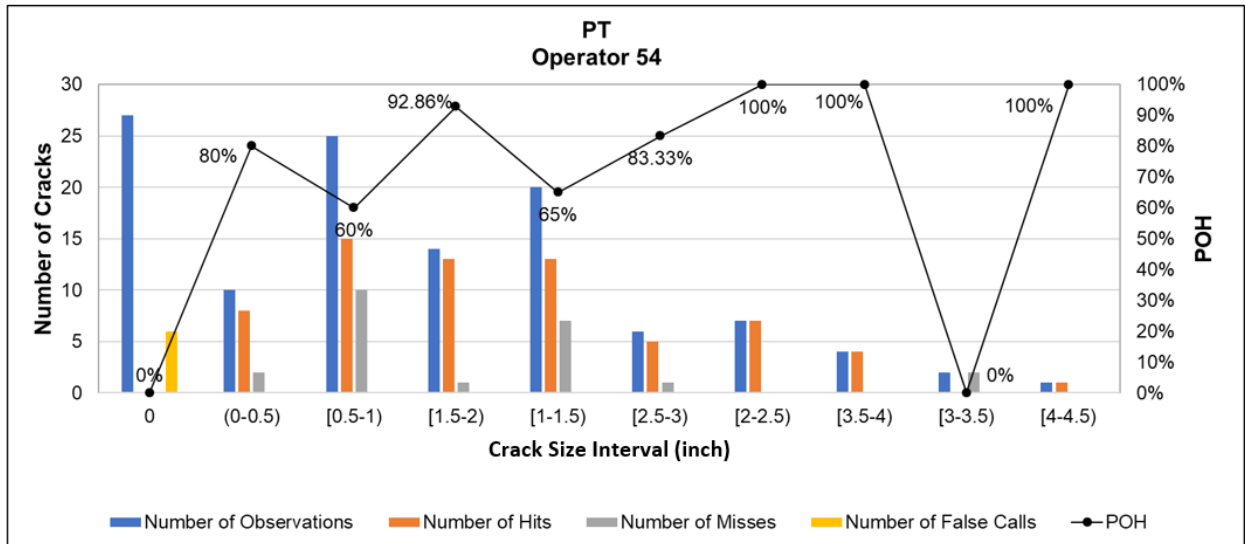


Figure 46. FW PT Distribution of Hits – Operator 54

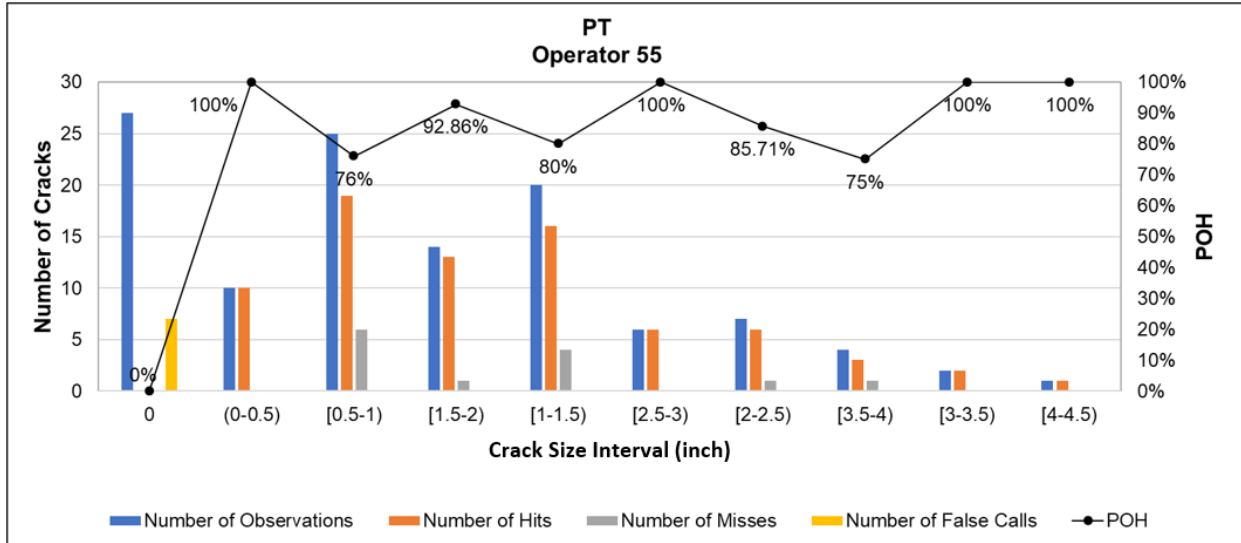


Figure 47. FW PT Distribution of Hits – Operator 55

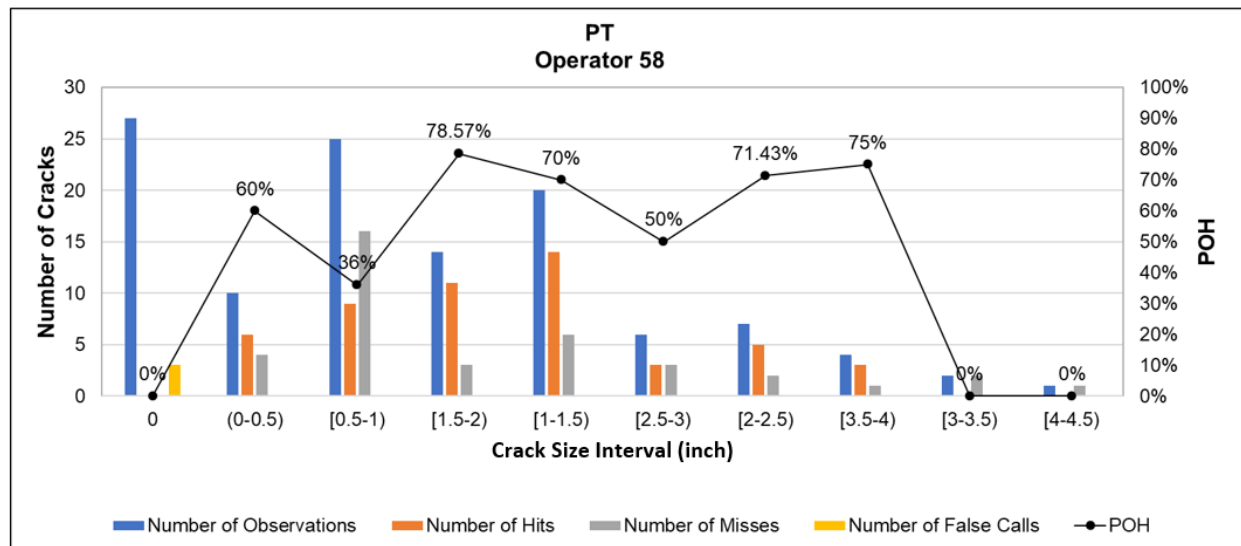


Figure 48. FW PT Distribution of Hits – Operator 58

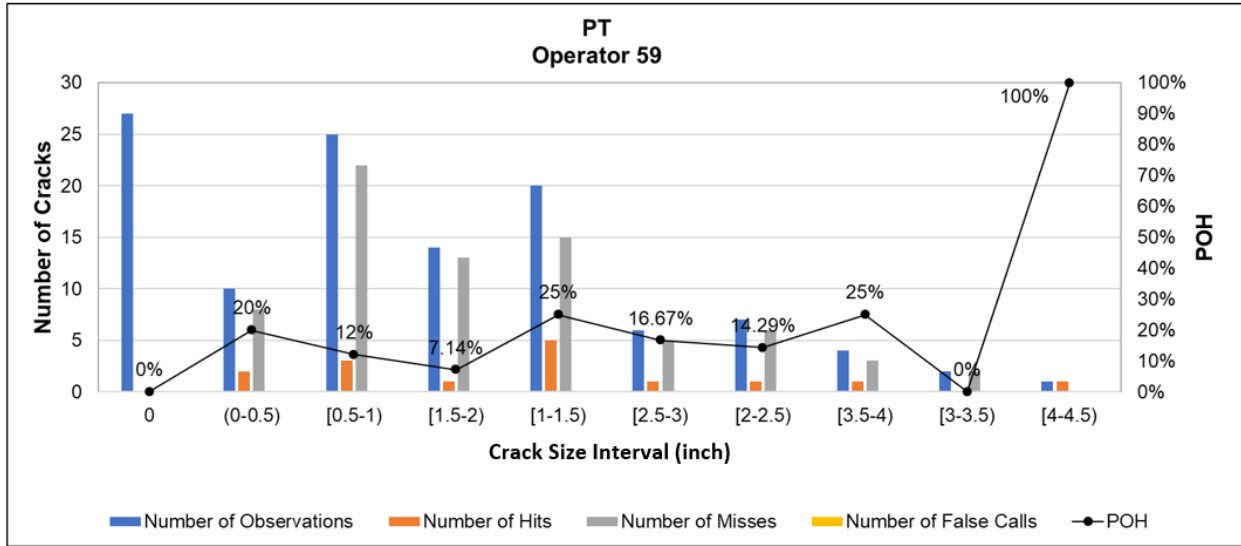


Figure 49. FW PT Distribution of Hits – Operator 59

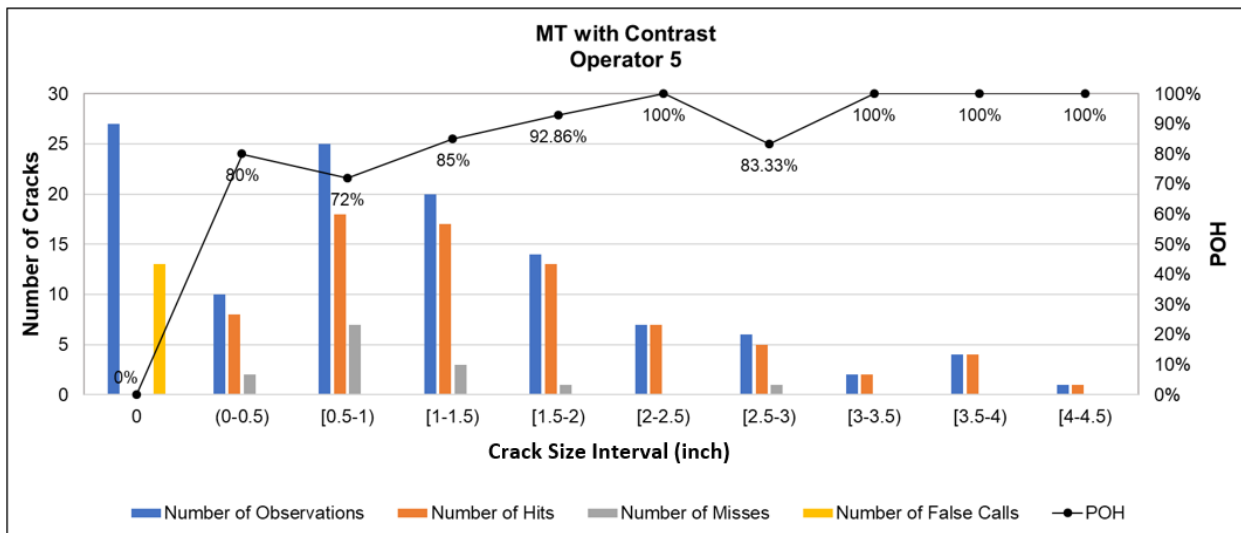


Figure 50. FW MT with Contrast Distribution of Hits – Operator 5

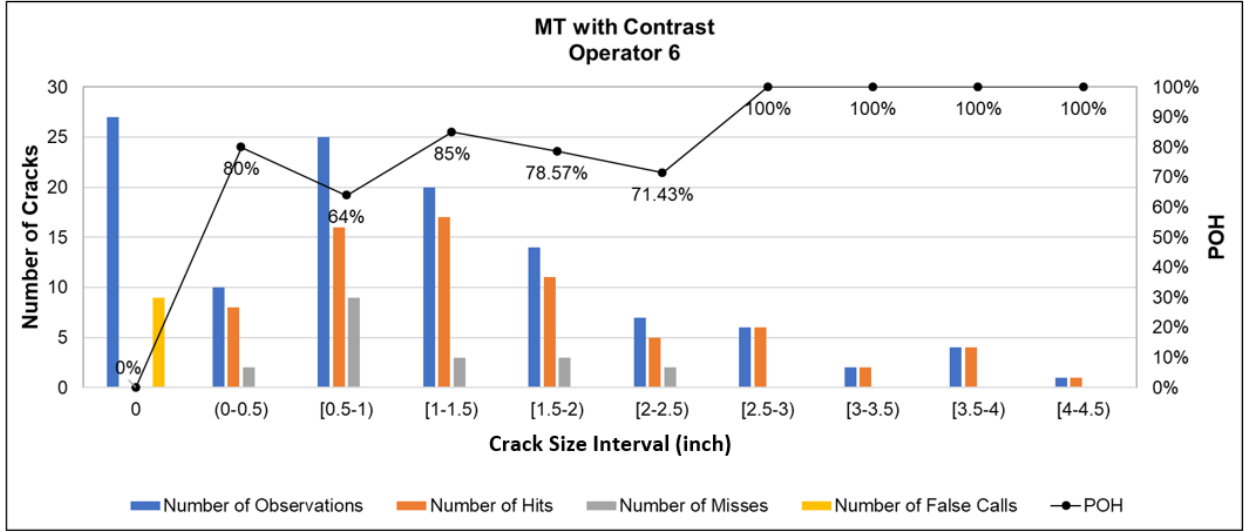


Figure 51. FW MT with Contrast Distribution of Hits – Operator 6

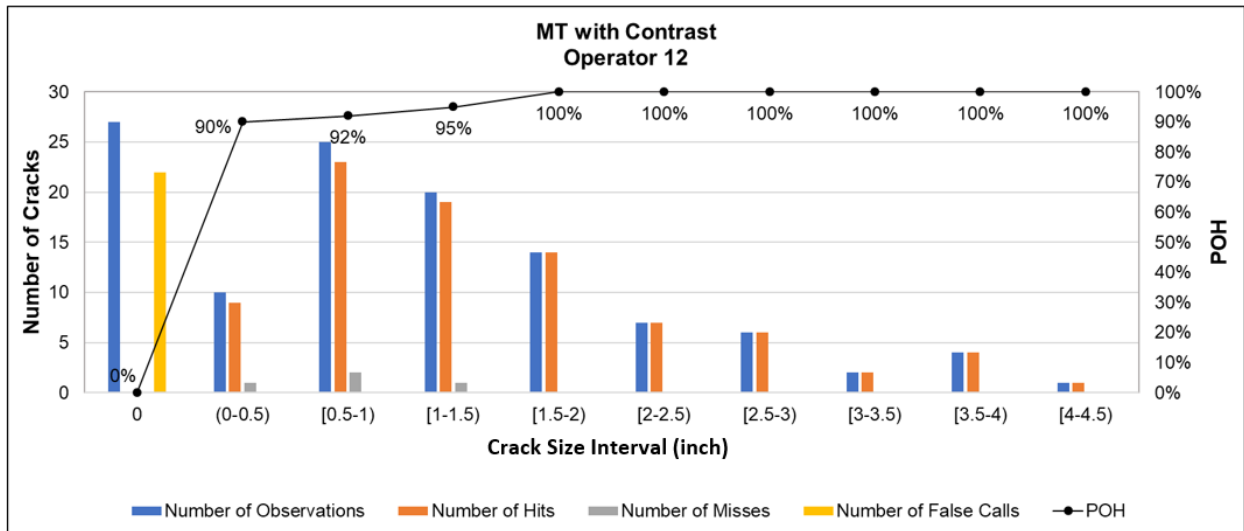


Figure 52. FW MT with Contrast Distribution of Hits – Operator 12

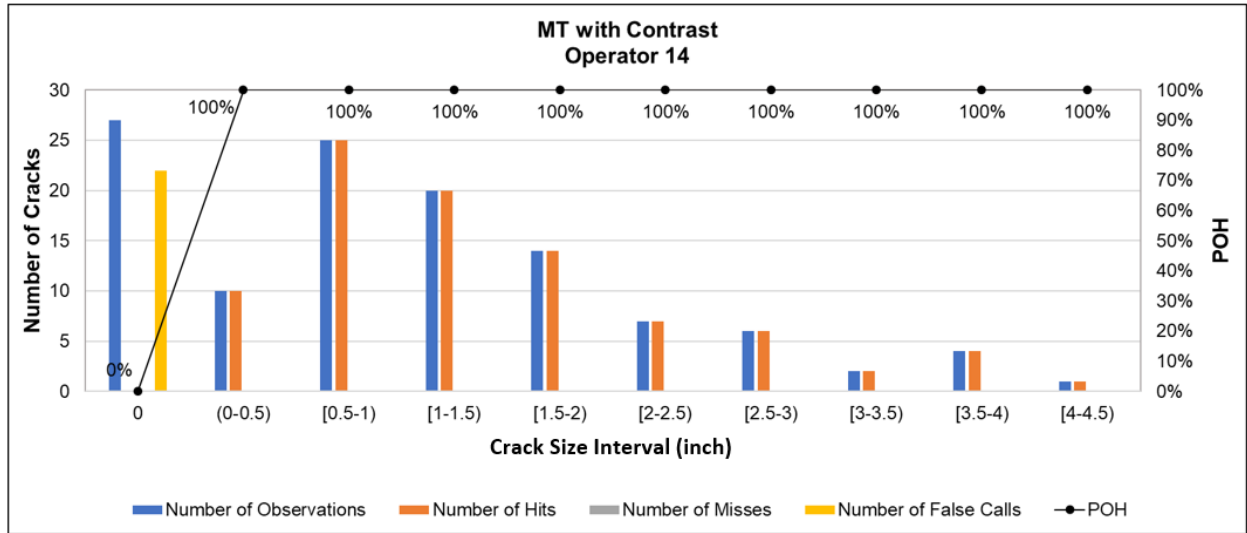


Figure 53. FW MT with Contrast Distribution of Hits – Operator 14

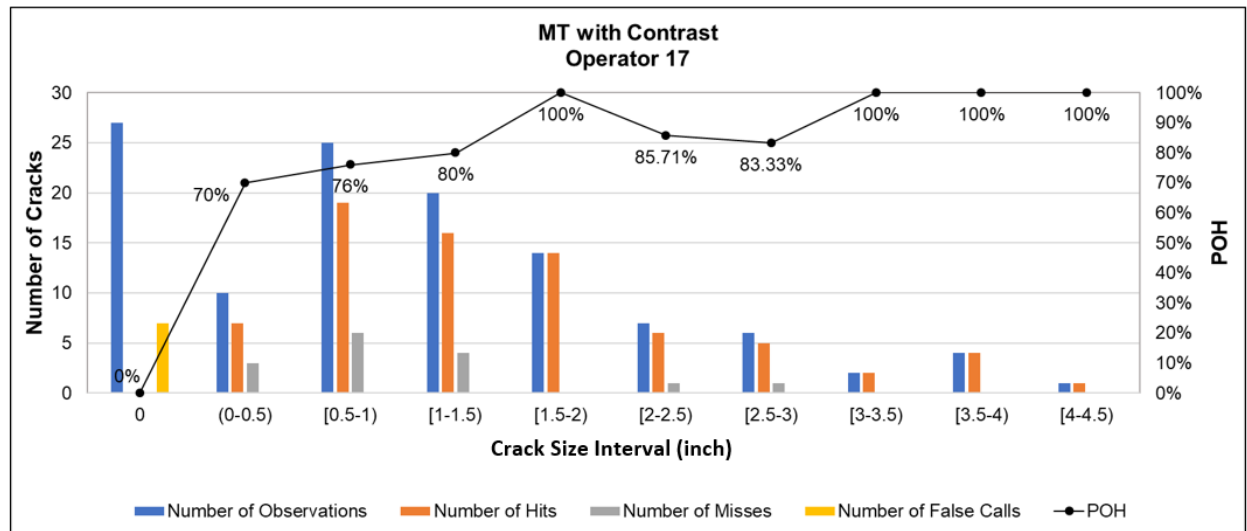


Figure 54. FW MT with Contrast Distribution of Hits – Operator 17

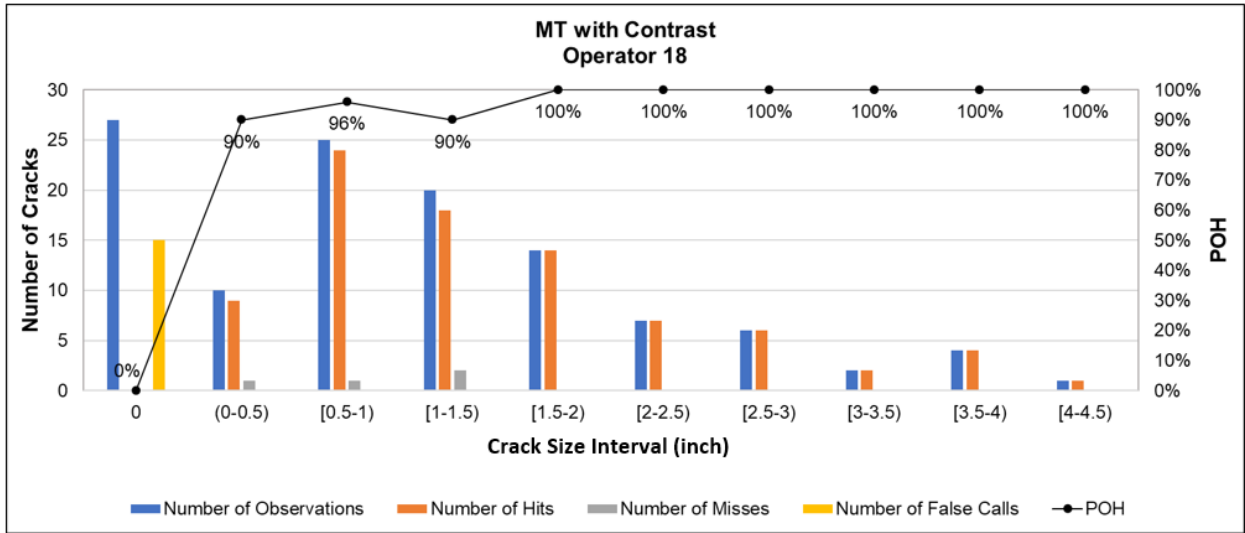


Figure 55. FW MT with Contrast Distribution of Hits – Operator 18

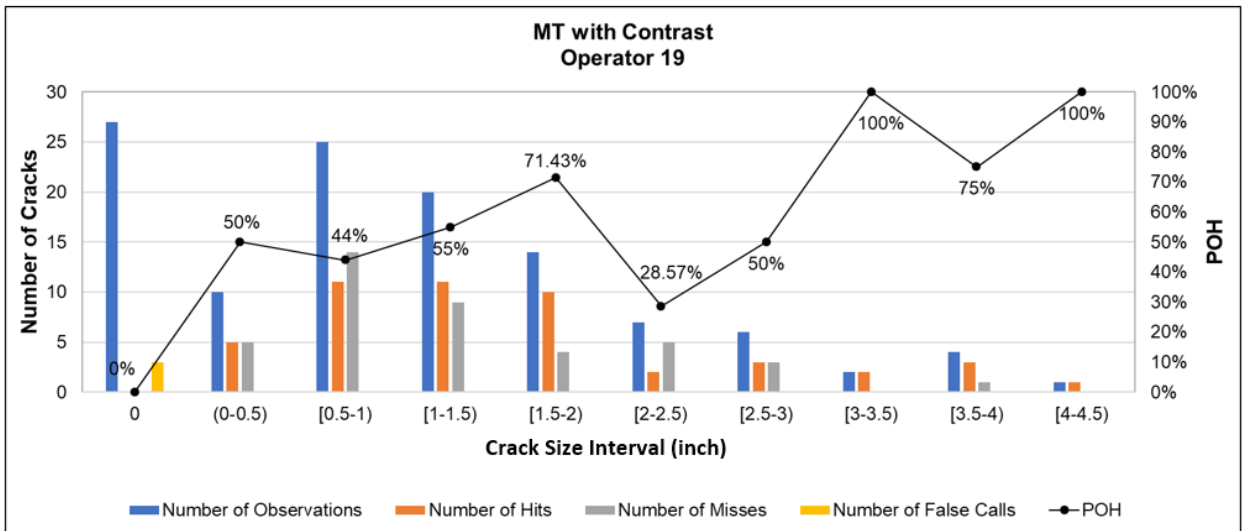


Figure 56. FW MT with Contrast Distribution of Hits – Operator 19

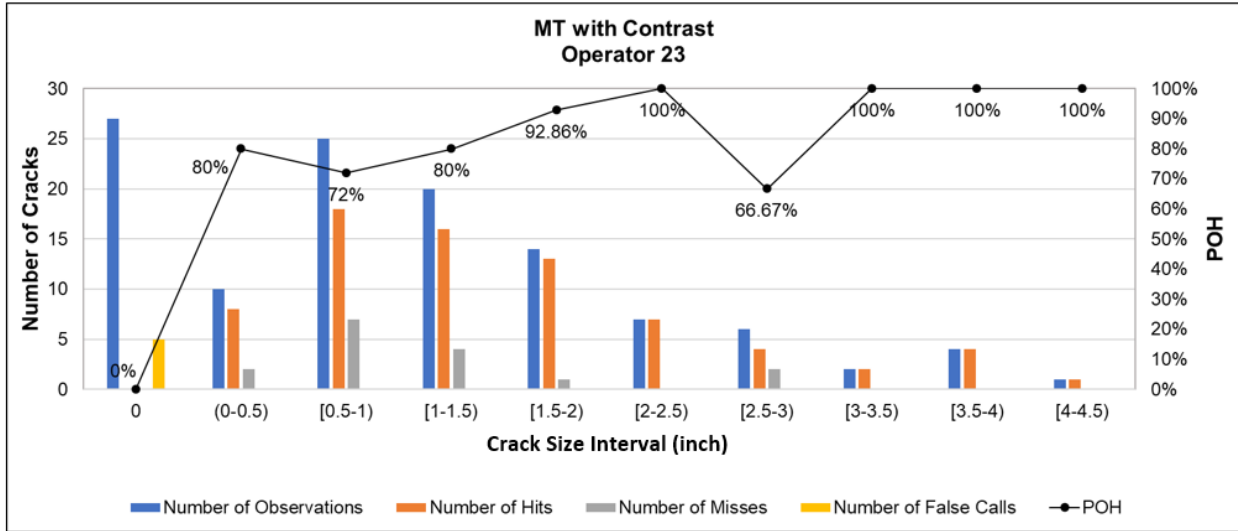


Figure 57. FW MT with Contrast Distribution of Hits – Operator 23

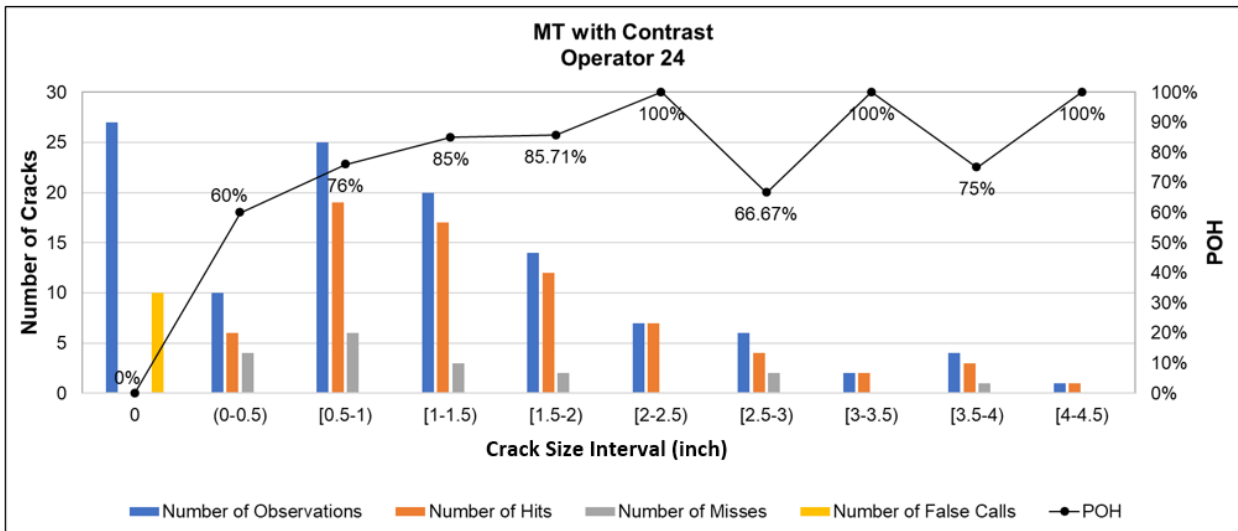


Figure 58. FW MT with Contrast Distribution of Hits – Operator 24

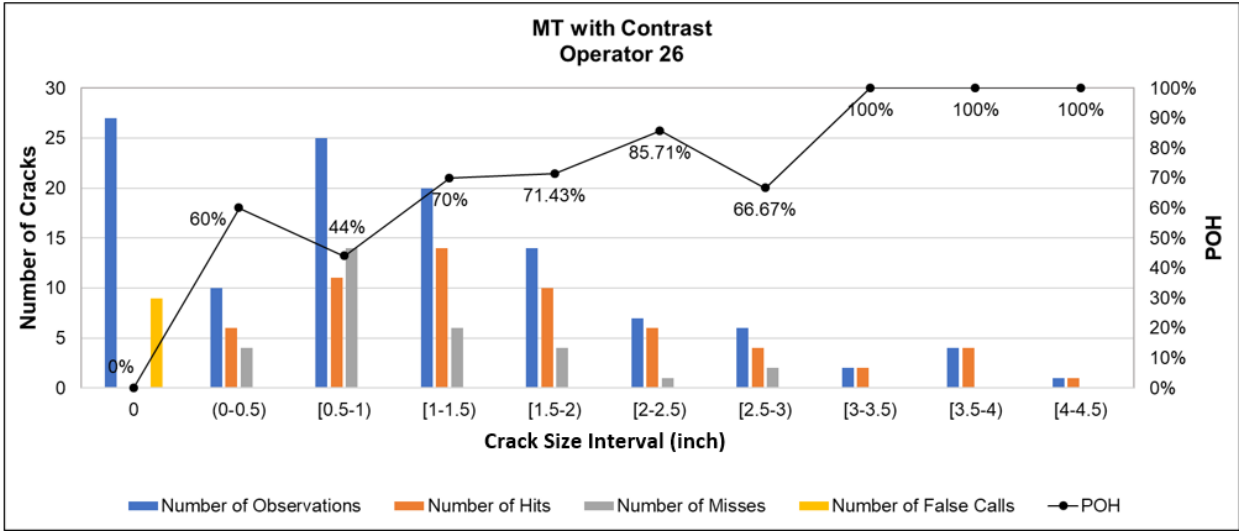


Figure 59. FW MT with Contrast Distribution of Hits – Operator 26

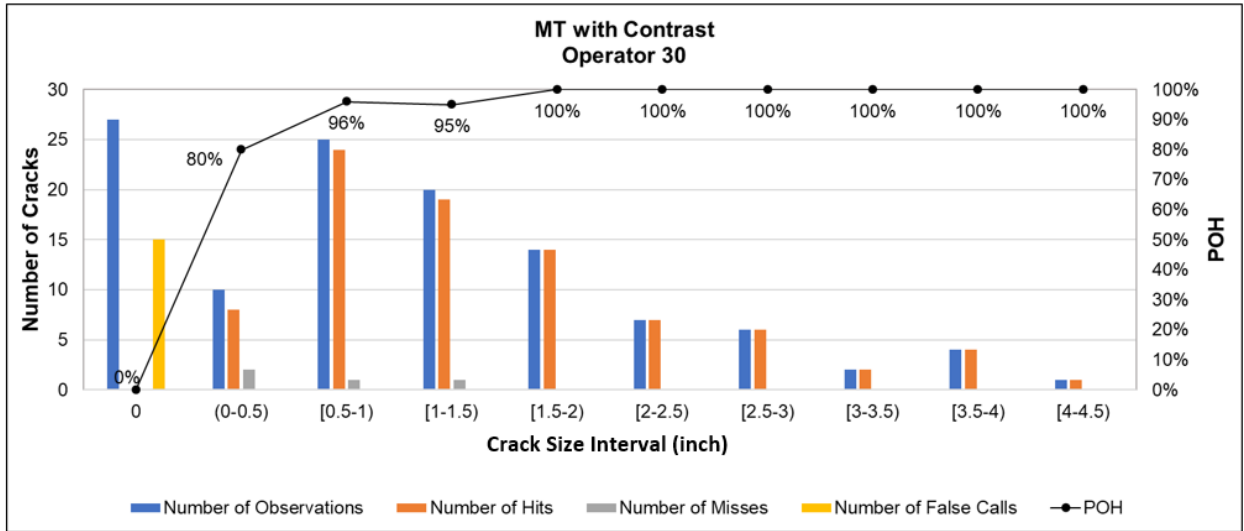


Figure 60. FW MT with Contrast Distribution of Hits – Operator 30

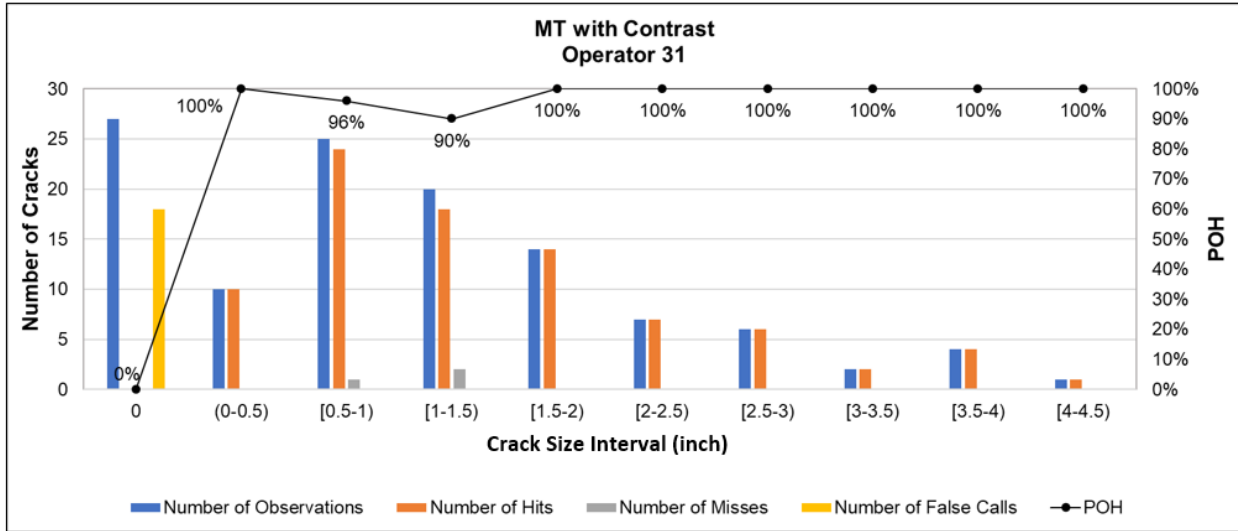


Figure 61. FW MT with Contrast Distribution of Hits – Operator 31

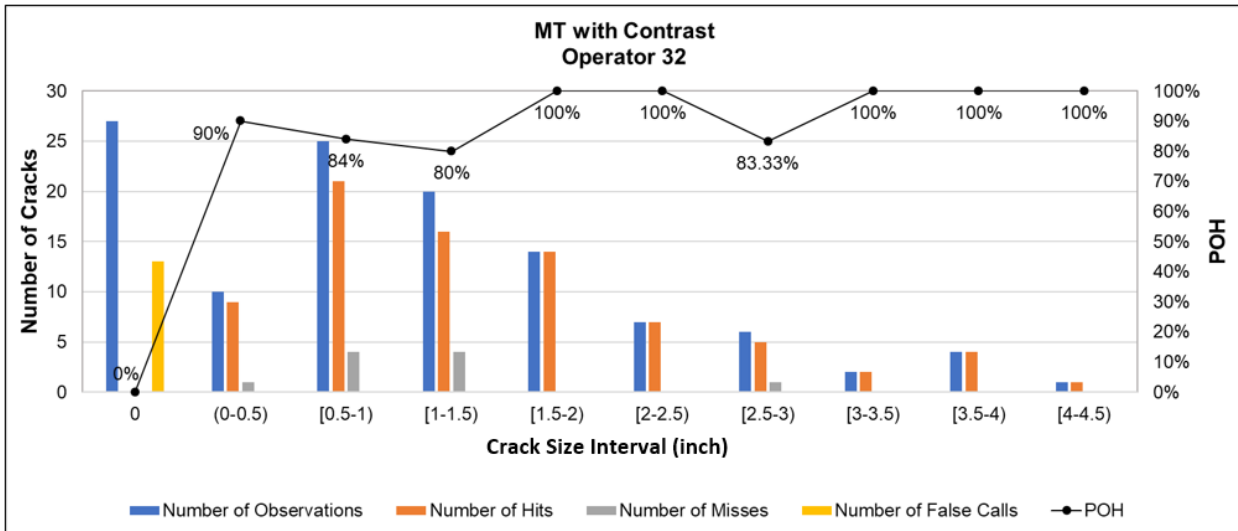


Figure 62. FW MT with Contrast Distribution of Hits – Operator 32

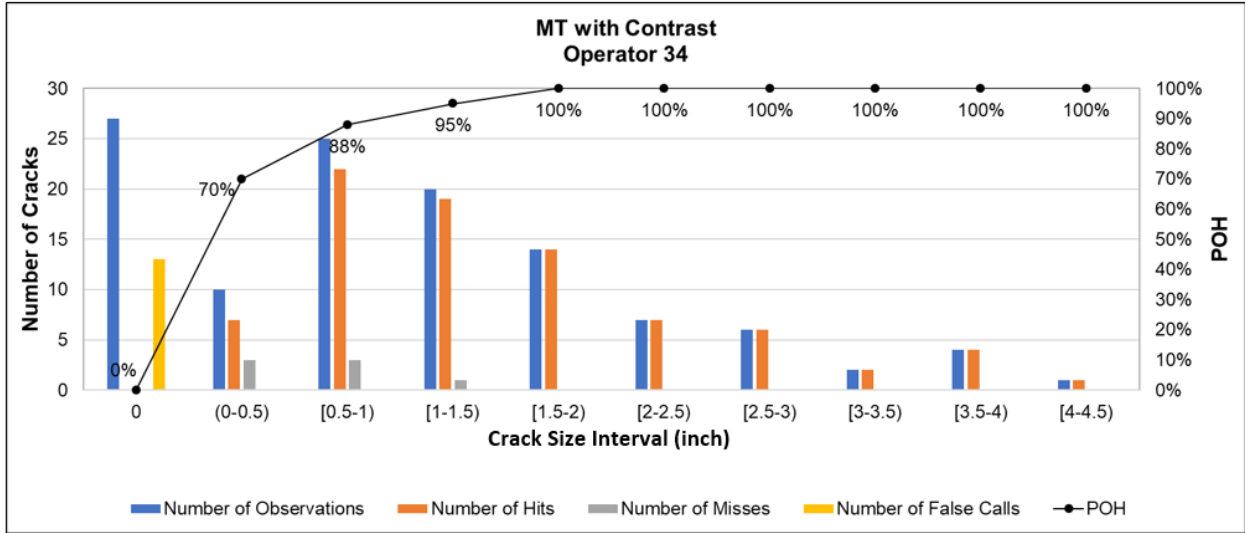


Figure 63. FW MT with Contrast Distribution of Hits – Operator 34

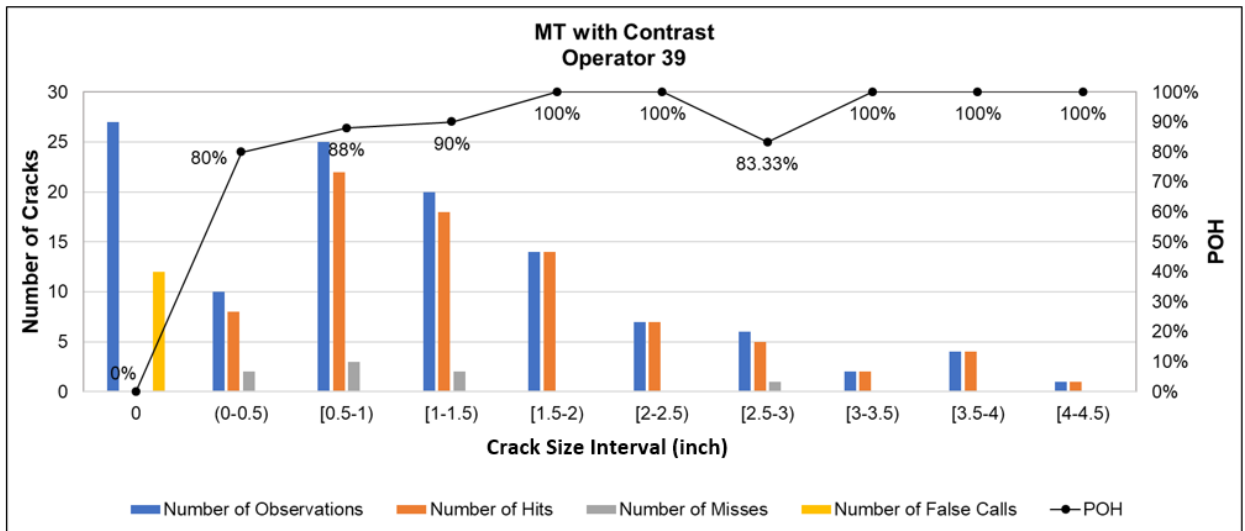


Figure 64. FW MT with Contrast Distribution of Hits – Operator 39

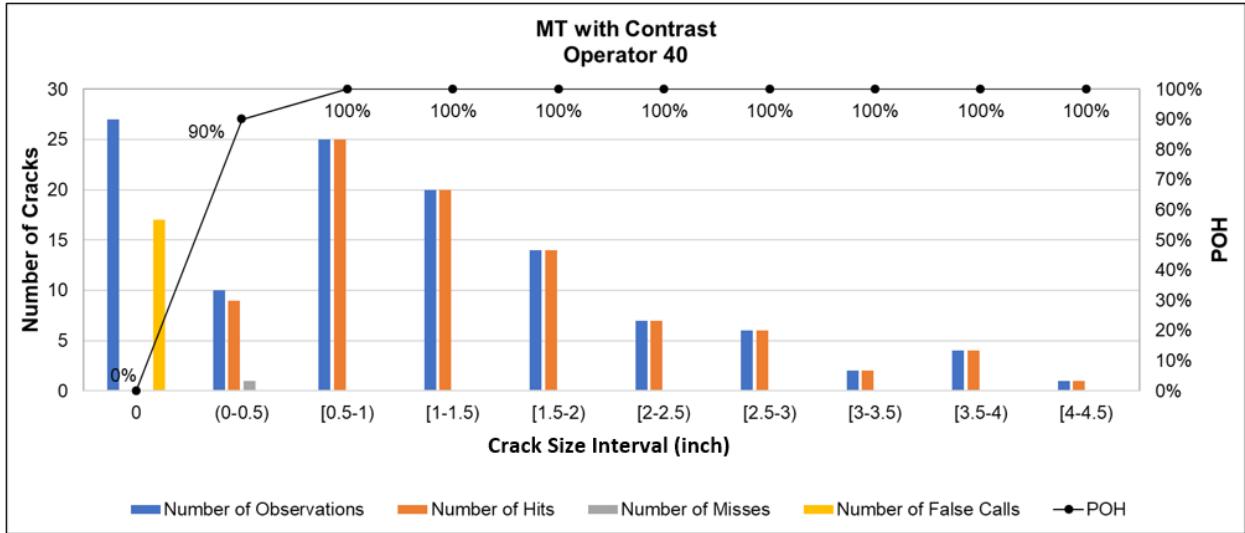


Figure 65. FW MT with Contrast Distribution of Hits – Operator 40

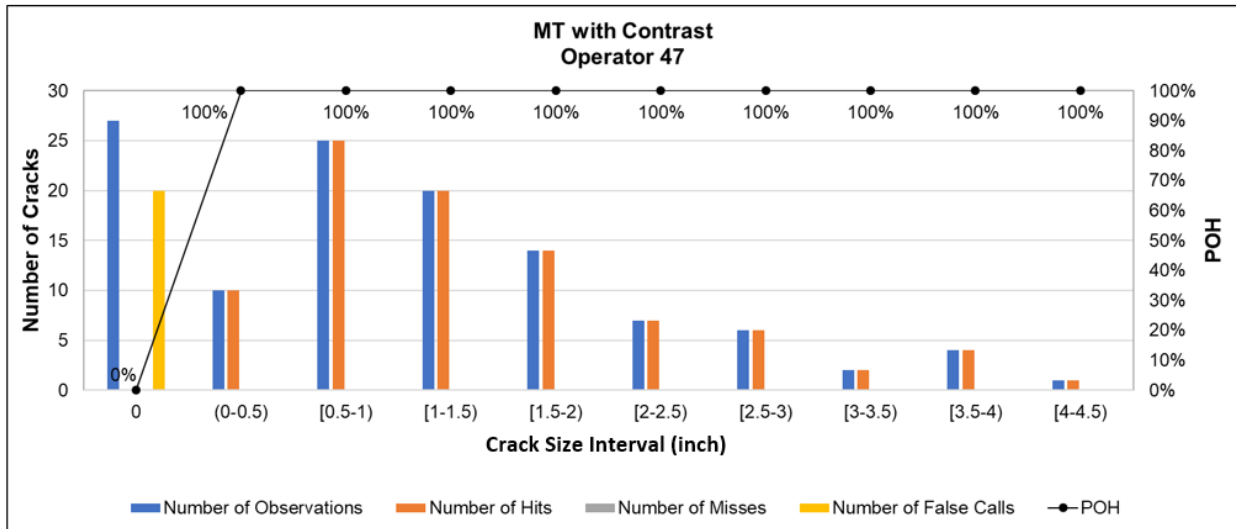


Figure 66. FW MT with Contrast Distribution of Hits – Operator 47

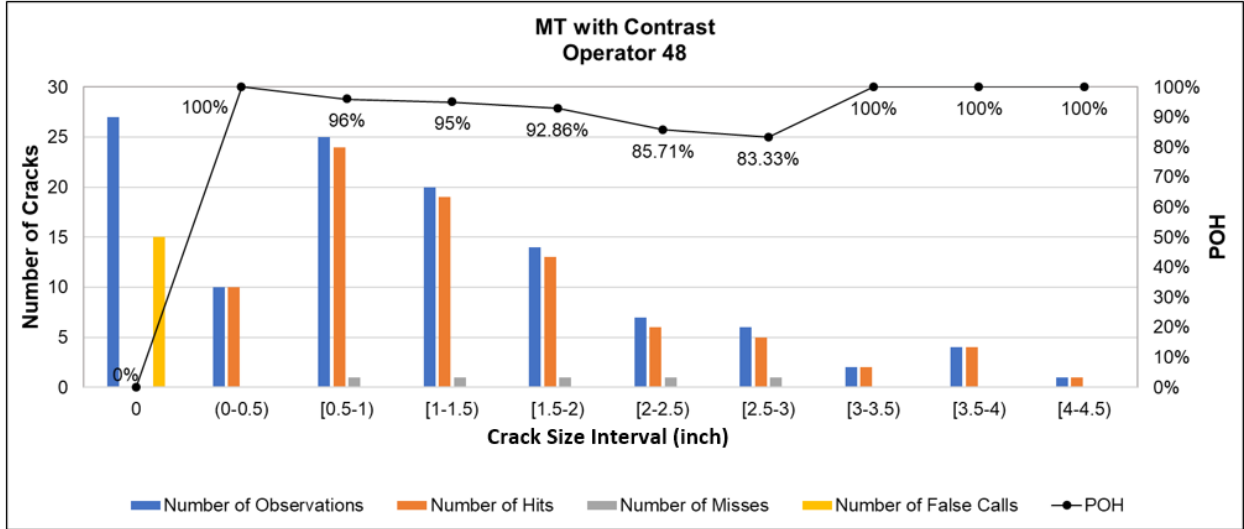


Figure 67. FW MT with Contrast Distribution of Hits – Operator 48

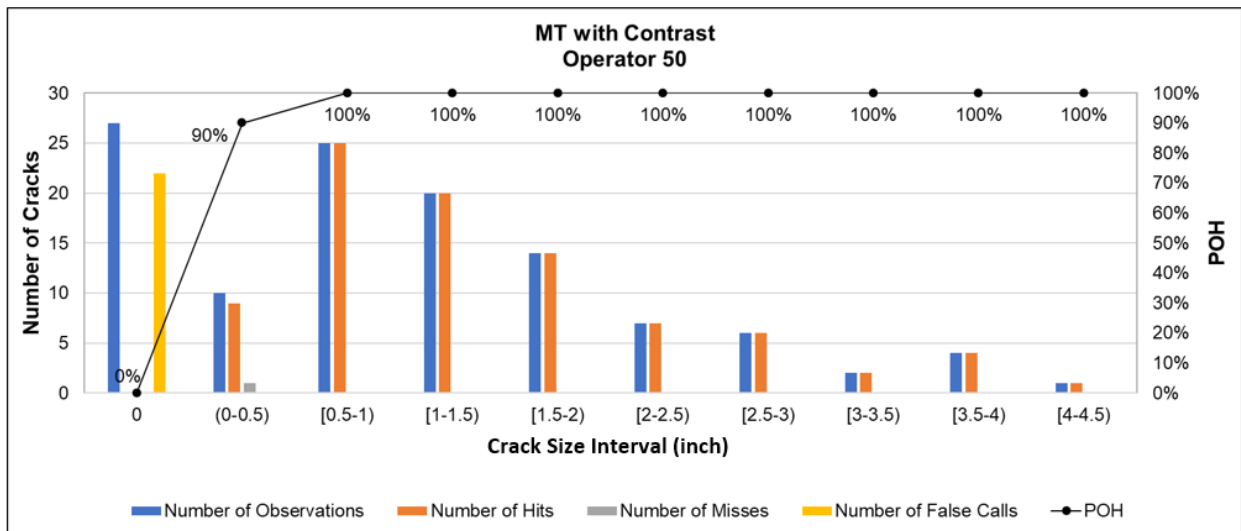


Figure 68. FW MT with Contrast Distribution of Hits – Operator 50

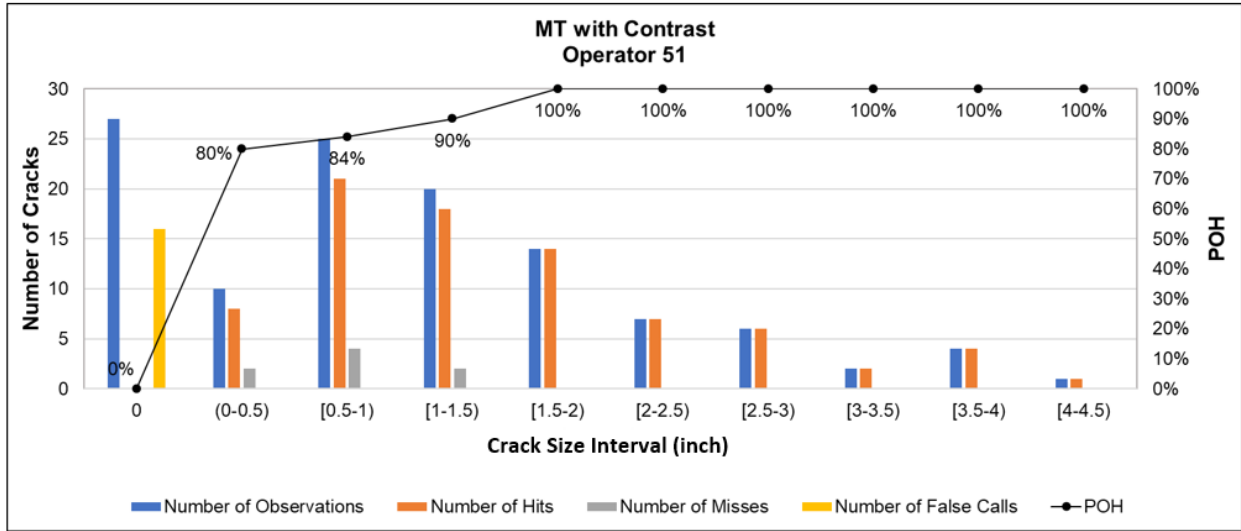


Figure 69. FW MT with Contrast Distribution of Hits – Operator 51

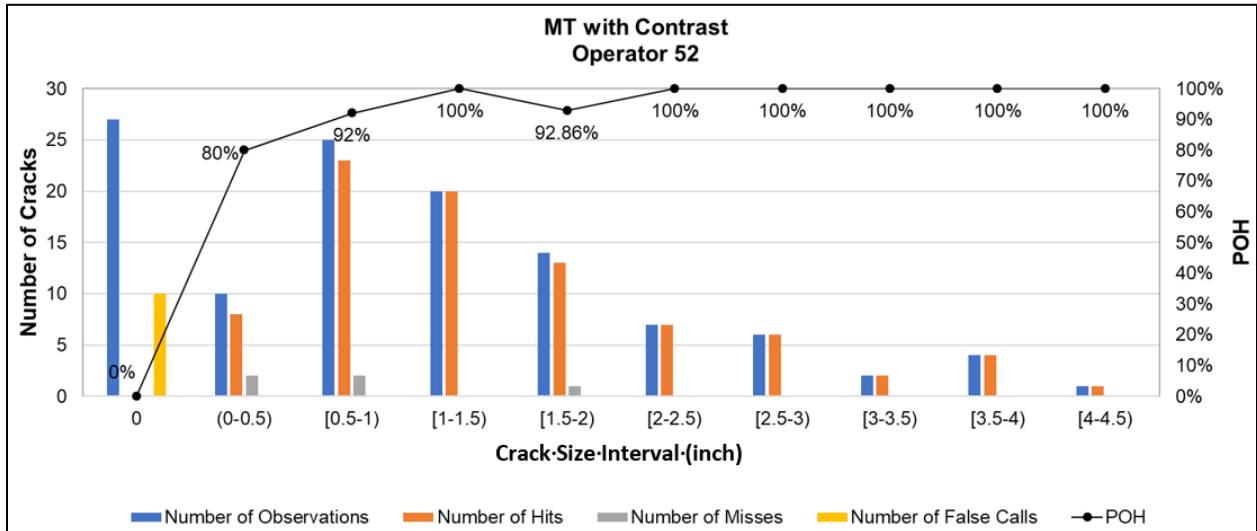


Figure 70. FW MT with Contrast Distribution of Hits – Operator 52

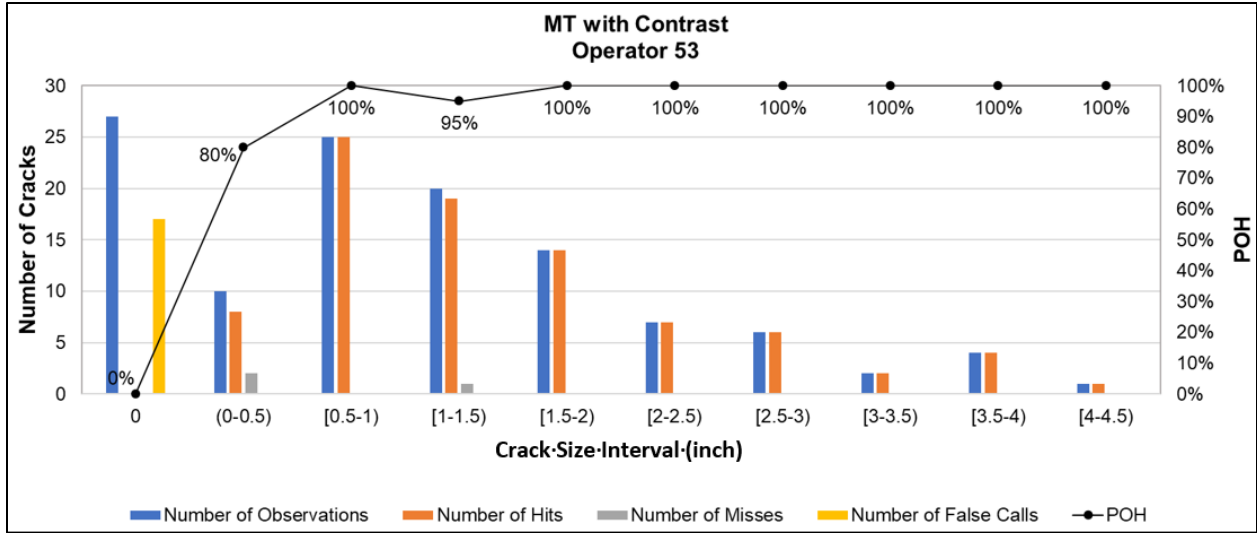


Figure 71. FW MT with Contrast Distribution of Hits – Operator 53

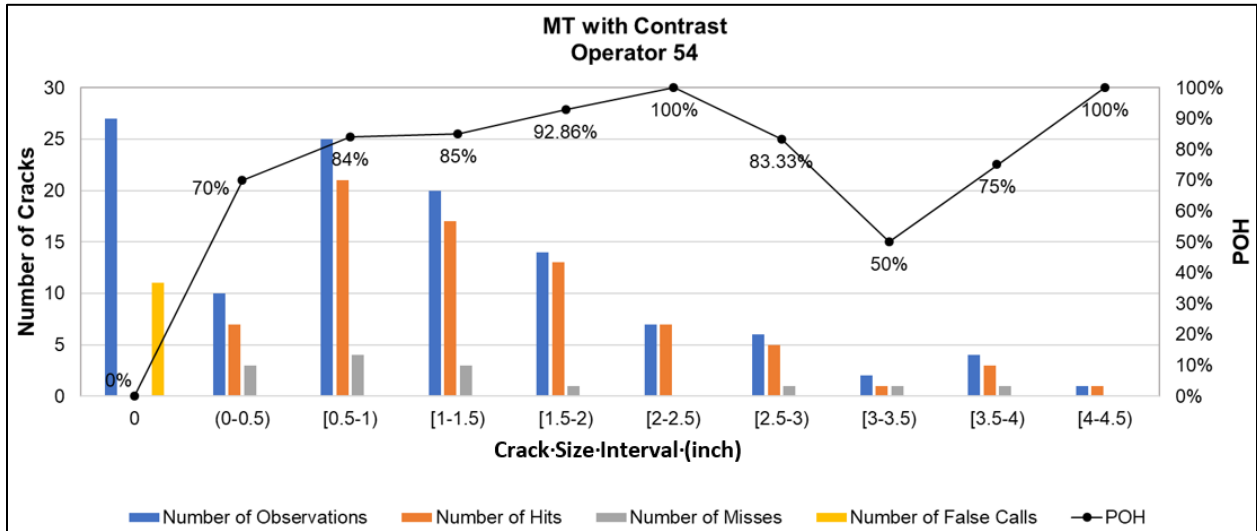


Figure 72. FW MT with Contrast Distribution of Hits – Operator 54

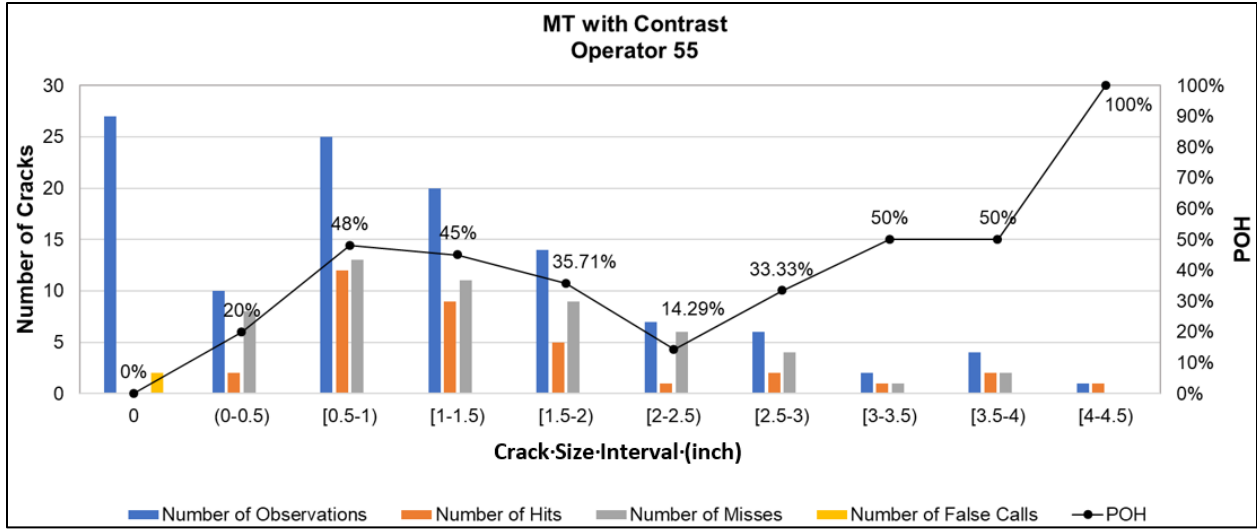


Figure 73. FW MT with Contrast Distribution of Hits – Operator 55

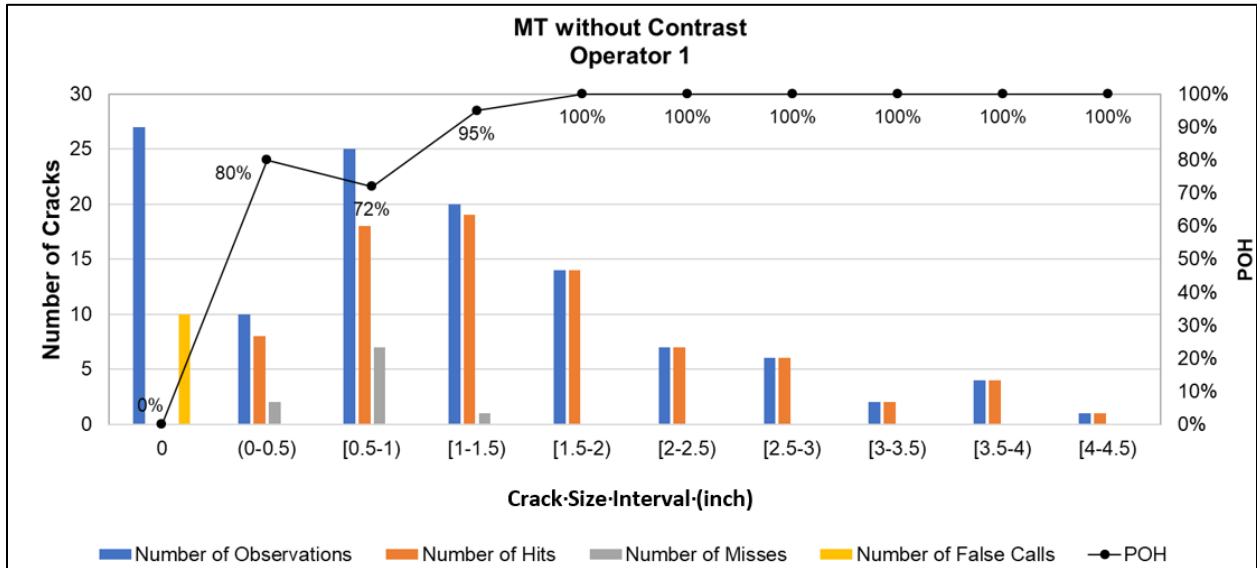


Figure 74. FW MT without Contrast Distribution of Hits – Operator 1

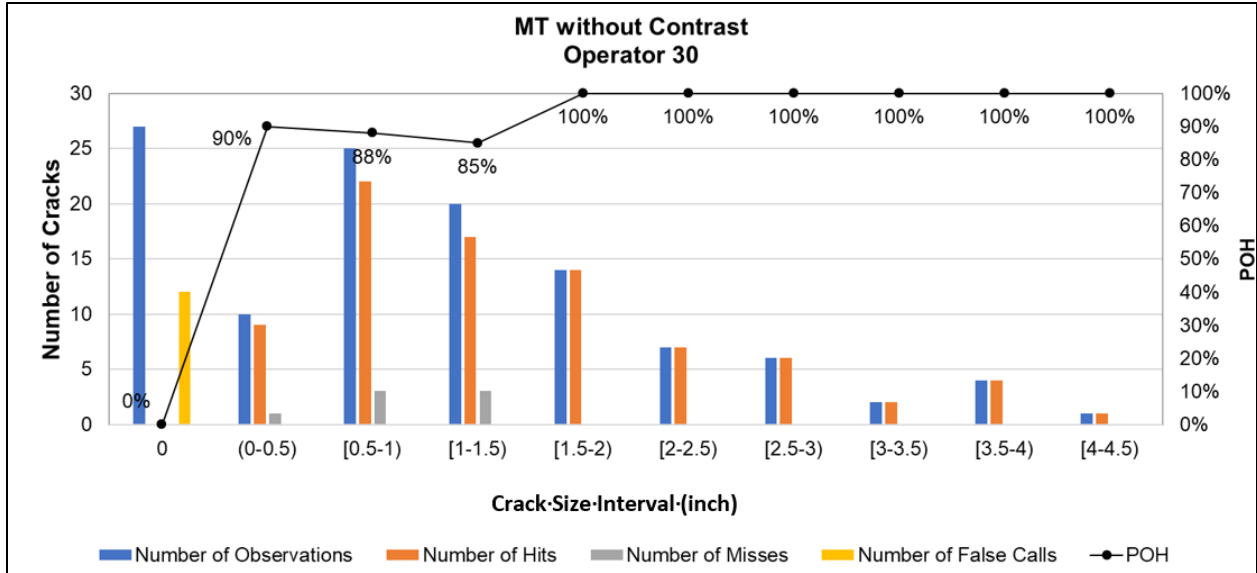


Figure 75. FW MT without Contrast Distribution of Hits – Operator 30

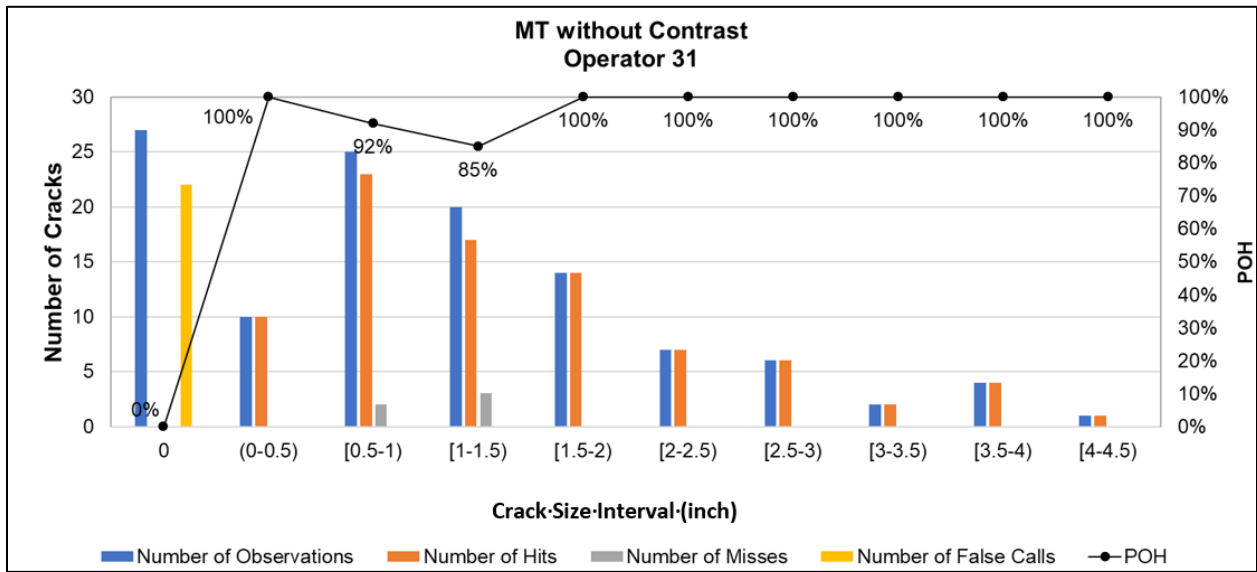


Figure 76. FW MT without Contrast Distribution of Hits – Operator 31

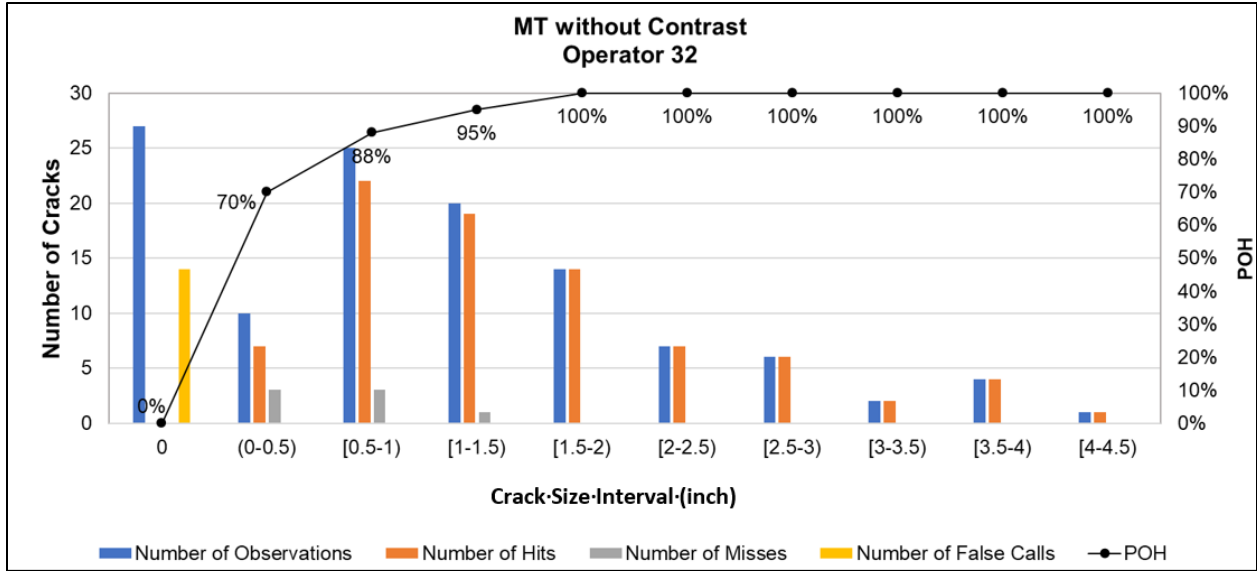


Figure 77. FW MT without Contrast Distribution of Hits – Operator 32

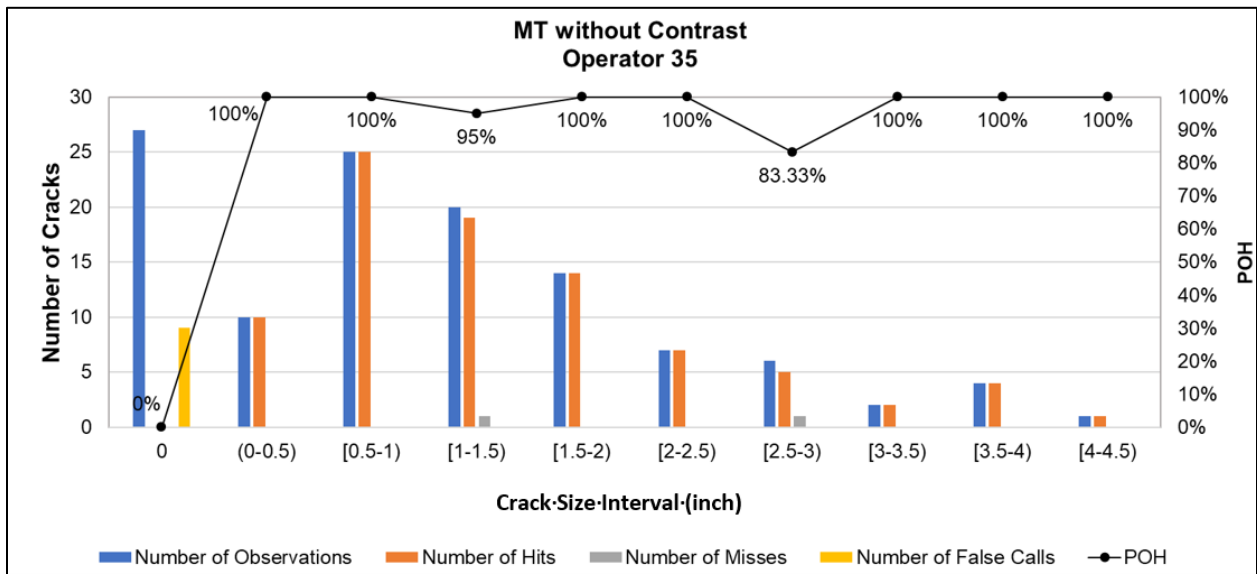


Figure 78. FW MT without Contrast Distribution of Hits – Operator 35

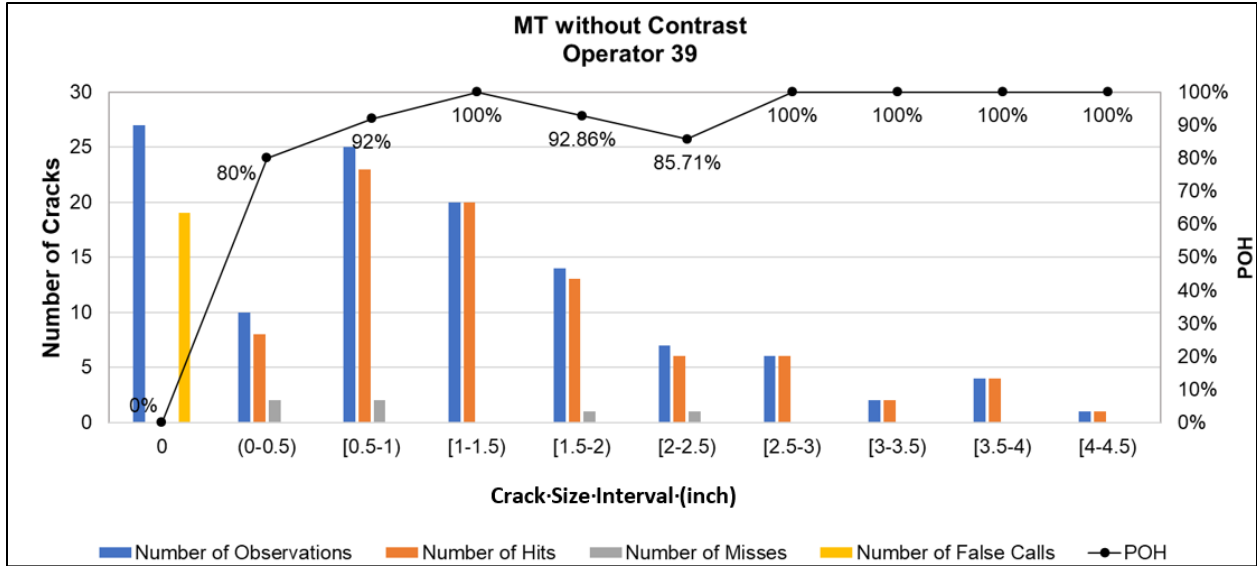


Figure 79. FW MT without Contrast Distribution of Hits – Operator 39

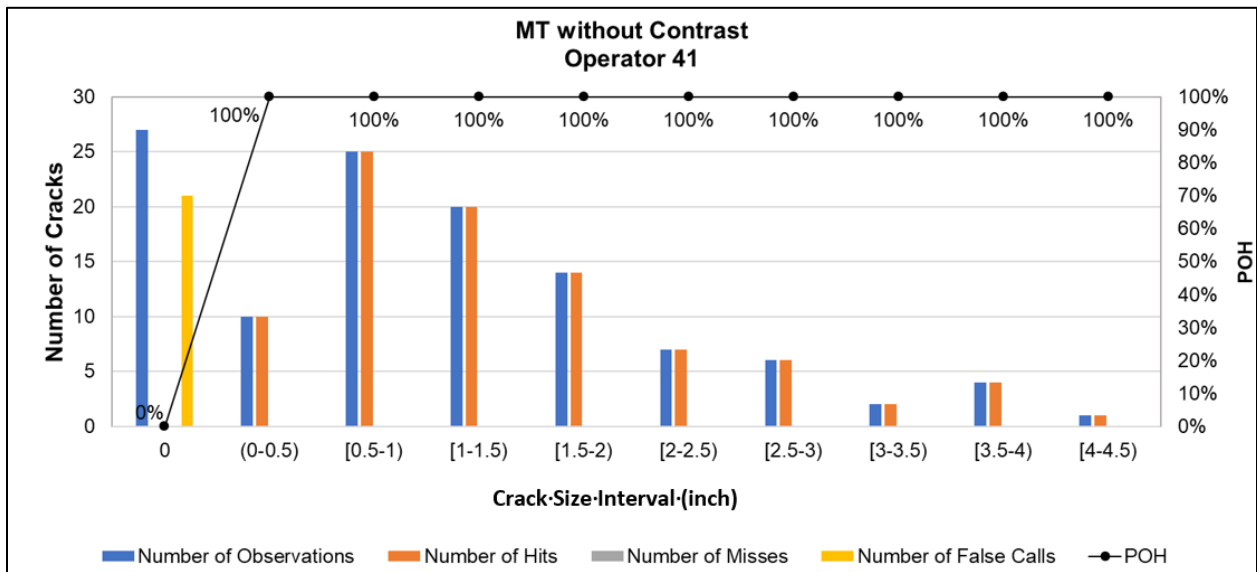


Figure 80. FW MT without Contrast Distribution of Hits – Operator 41

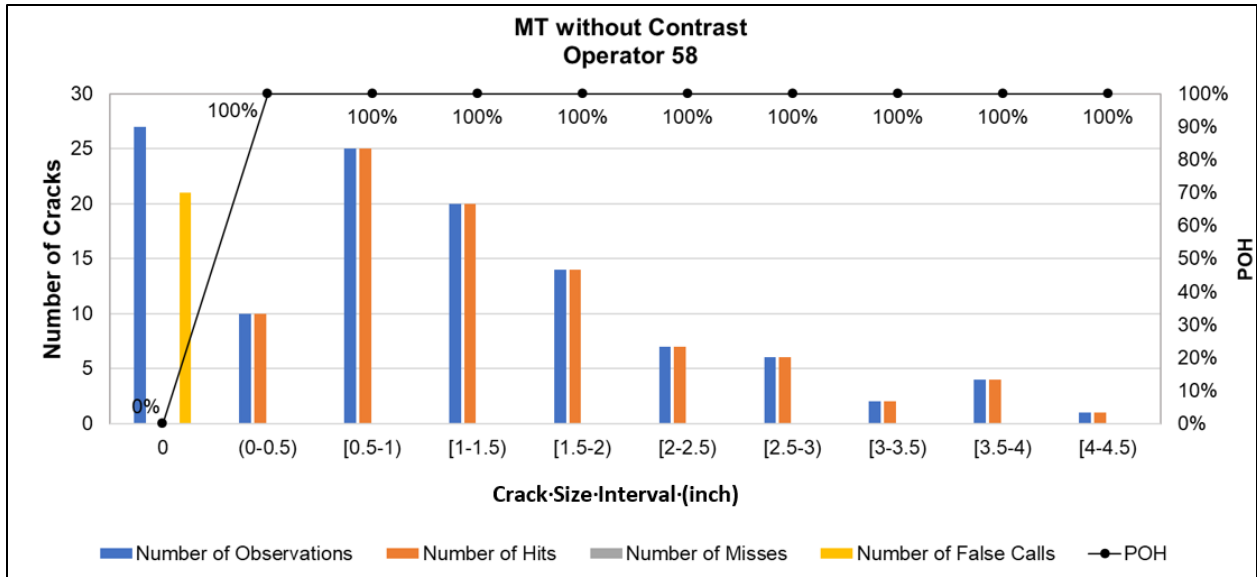


Figure 81. FW MT without Contrast Distribution of Hits – Operator 58

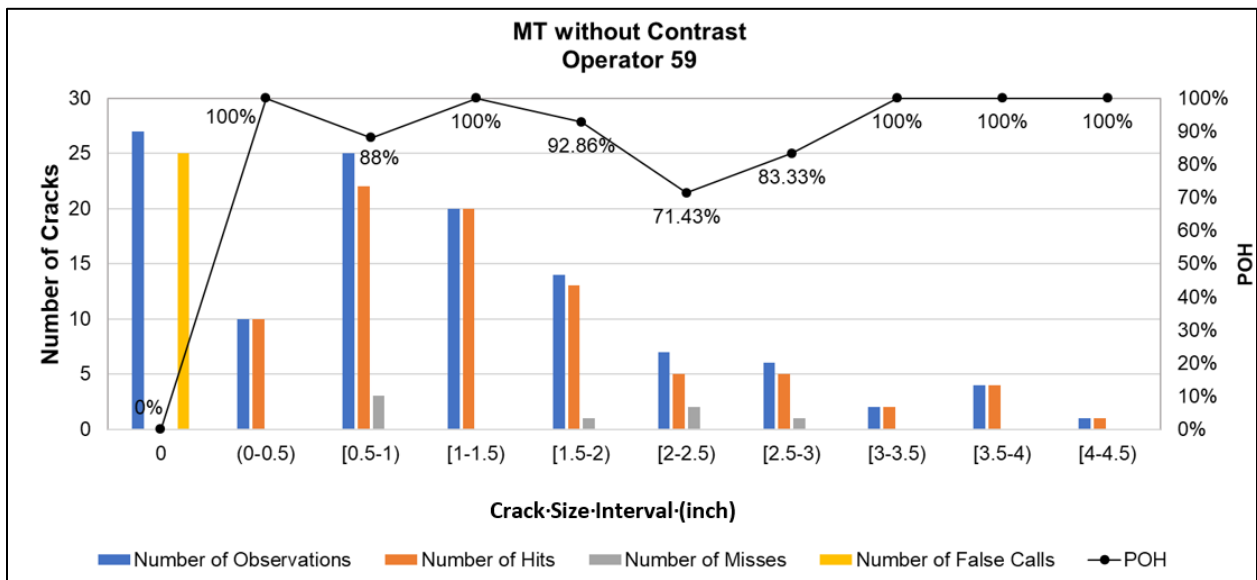


Figure 82. FW MT without Contrast Distribution of Hits – Operator 59

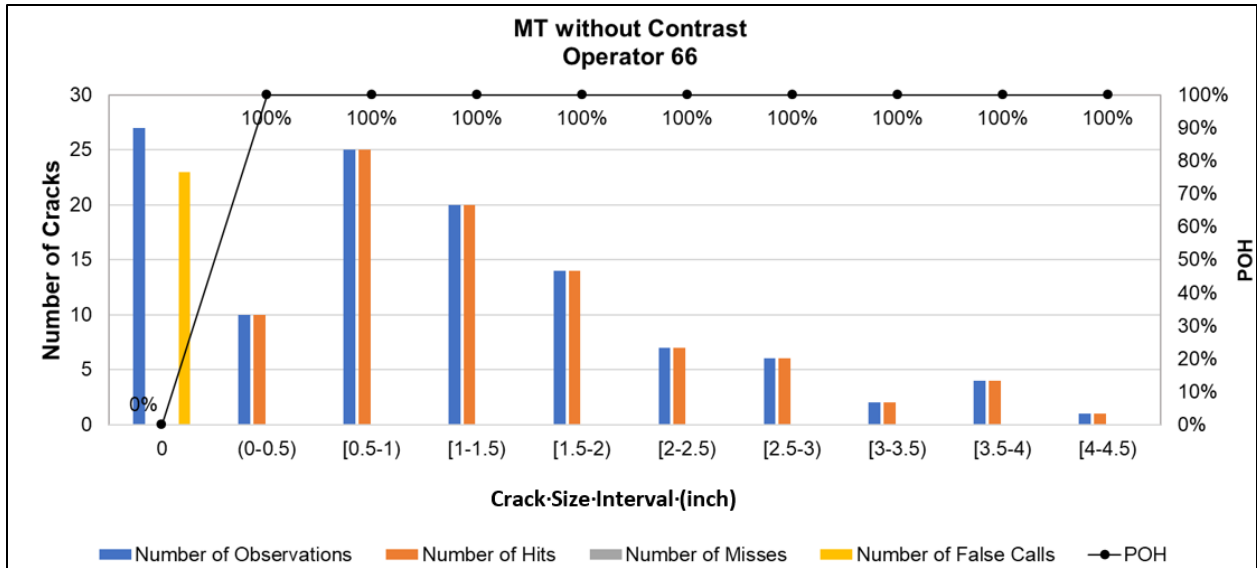


Figure 83. FW MT without Contrast Distribution of Hits – Operator 66

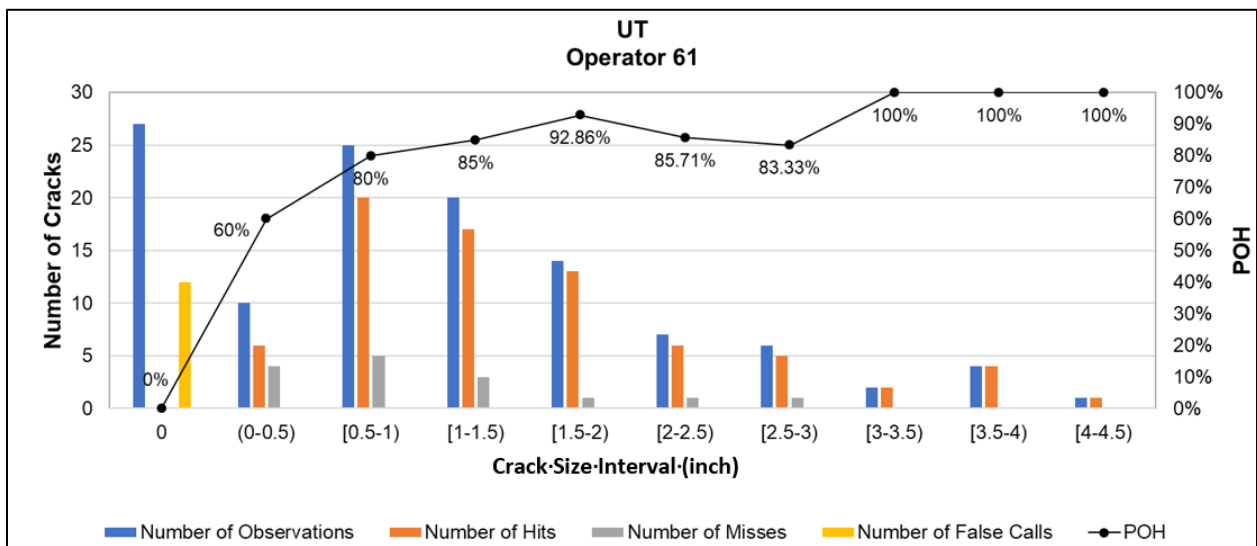


Figure 84. FW UT Distribution of Hits – Operator 61

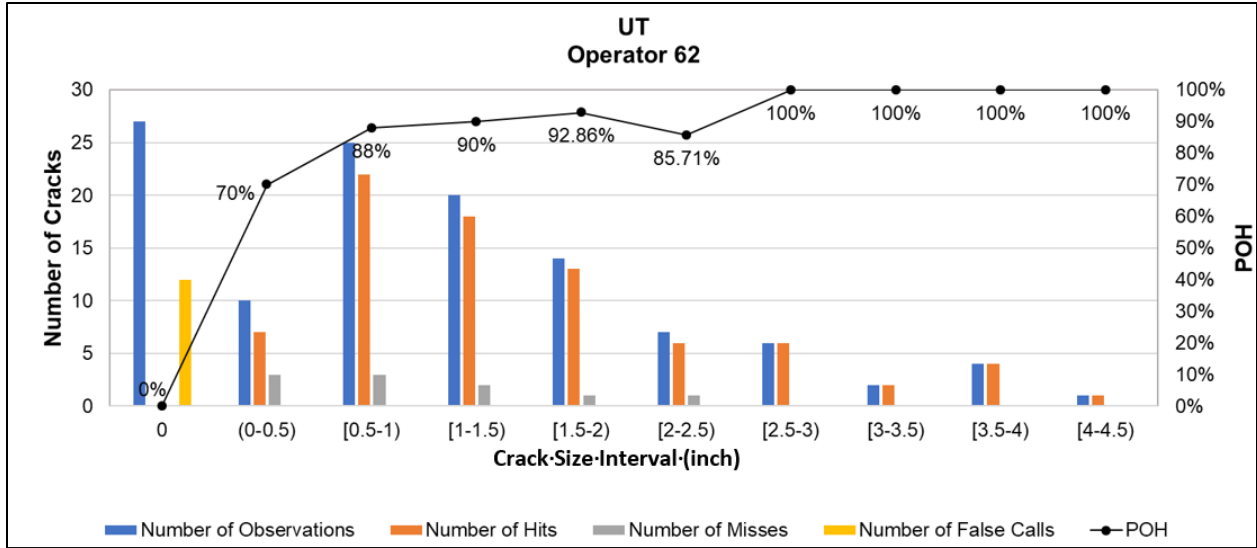


Figure 85. FW UT Distribution of Hits – Operator 62

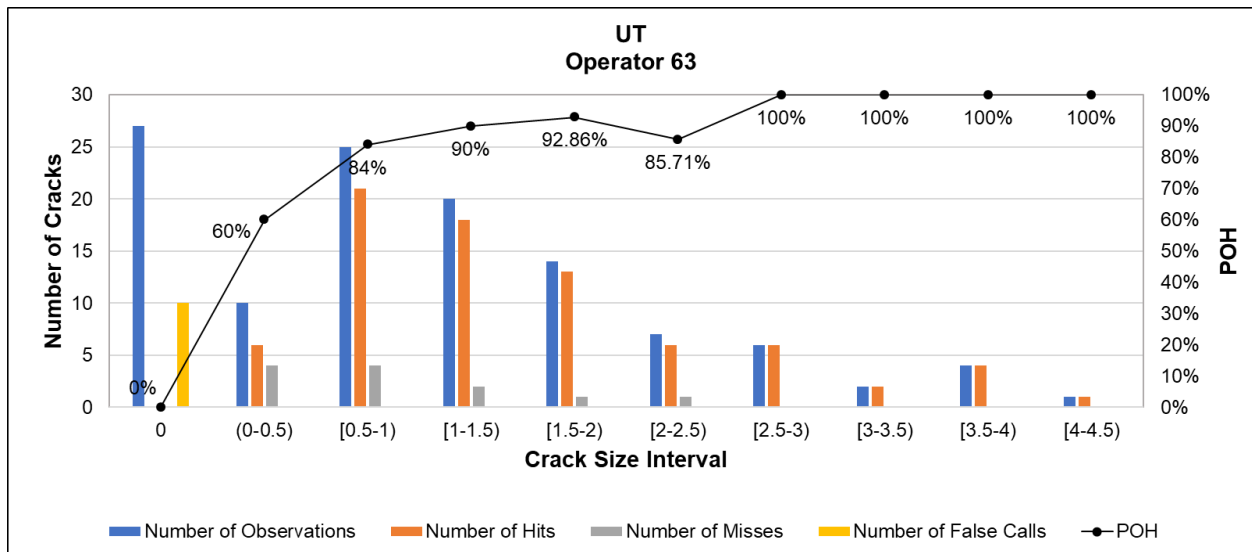


Figure 86. FW UT Distribution of Hits – Operator 63

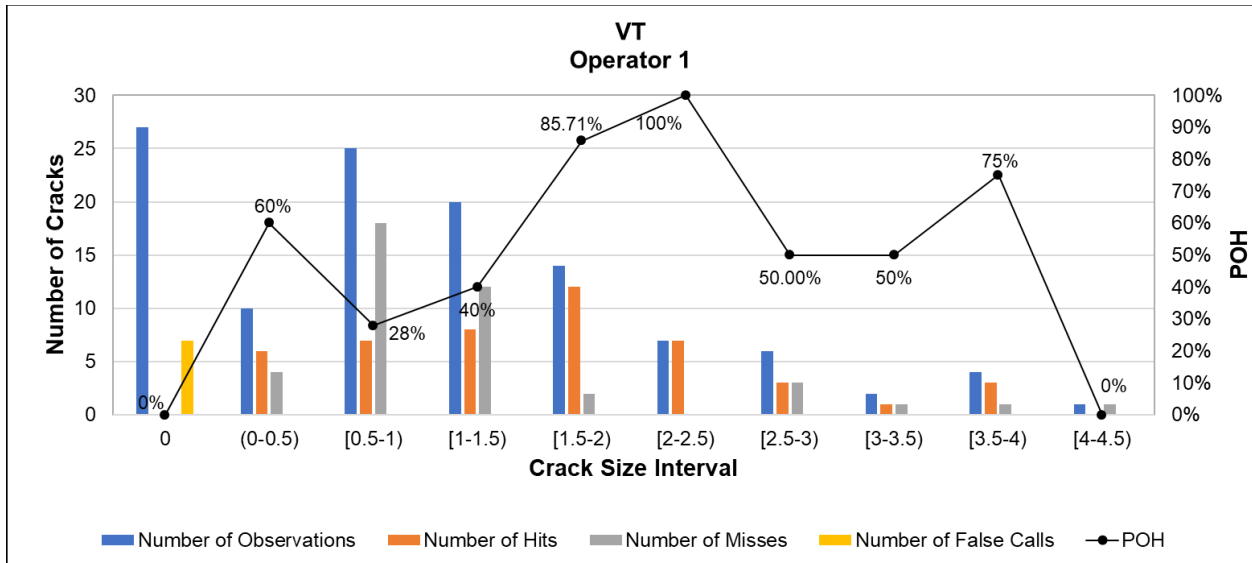


Figure 87. FW VT Distribution of Hits – Operator 1

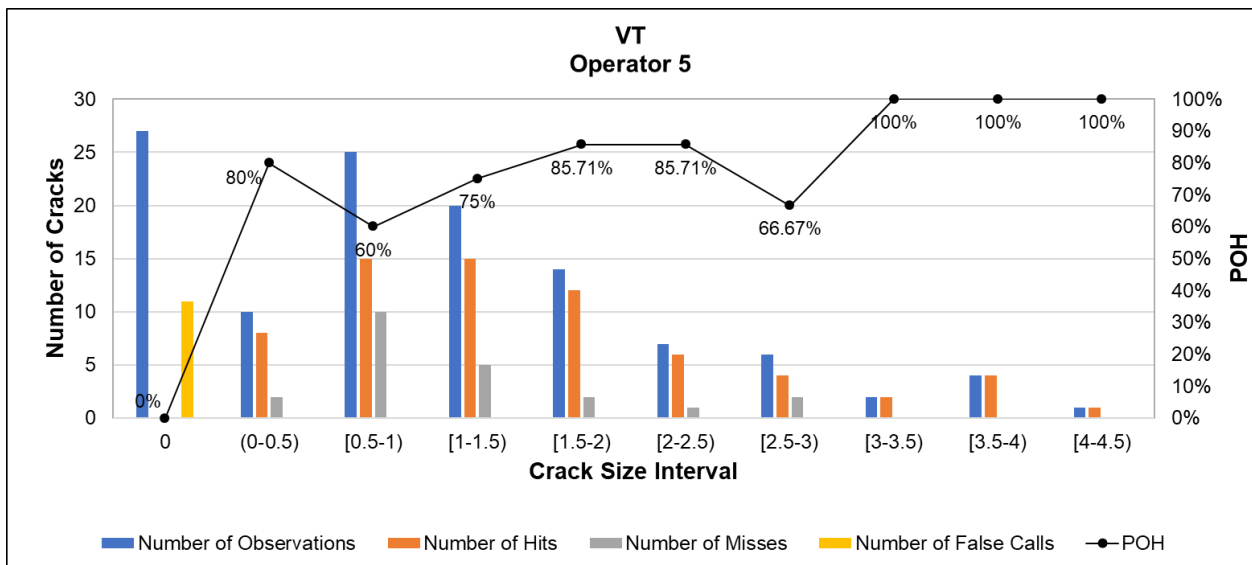


Figure 88. FW VT Distribution of Hits – Operator 5

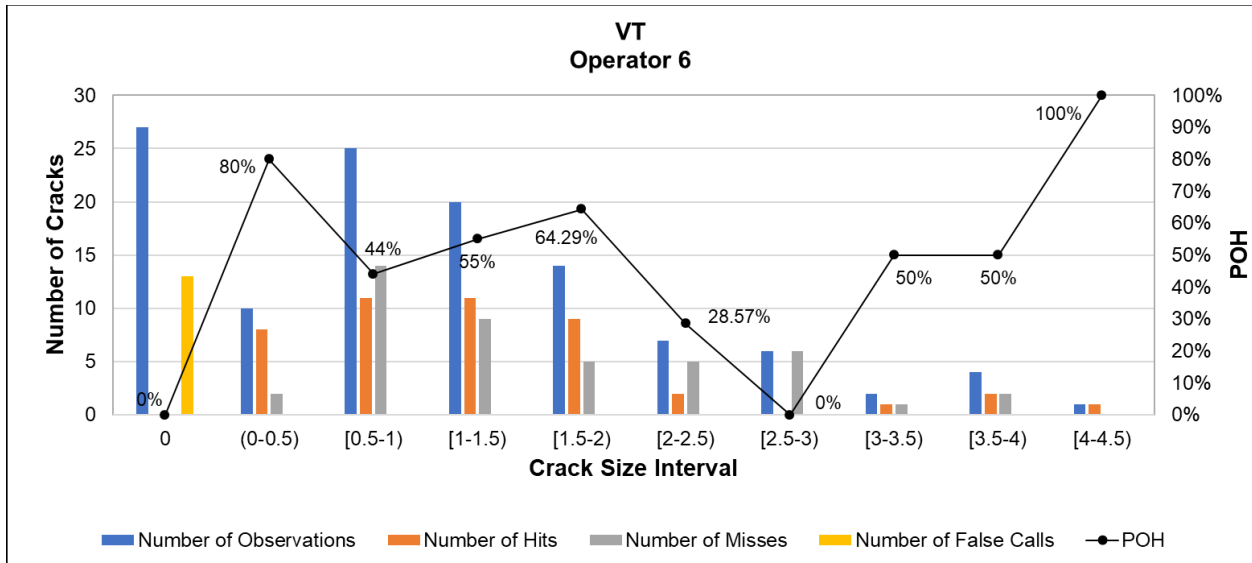


Figure 89. FW VT Distribution of Hits – Operator 6

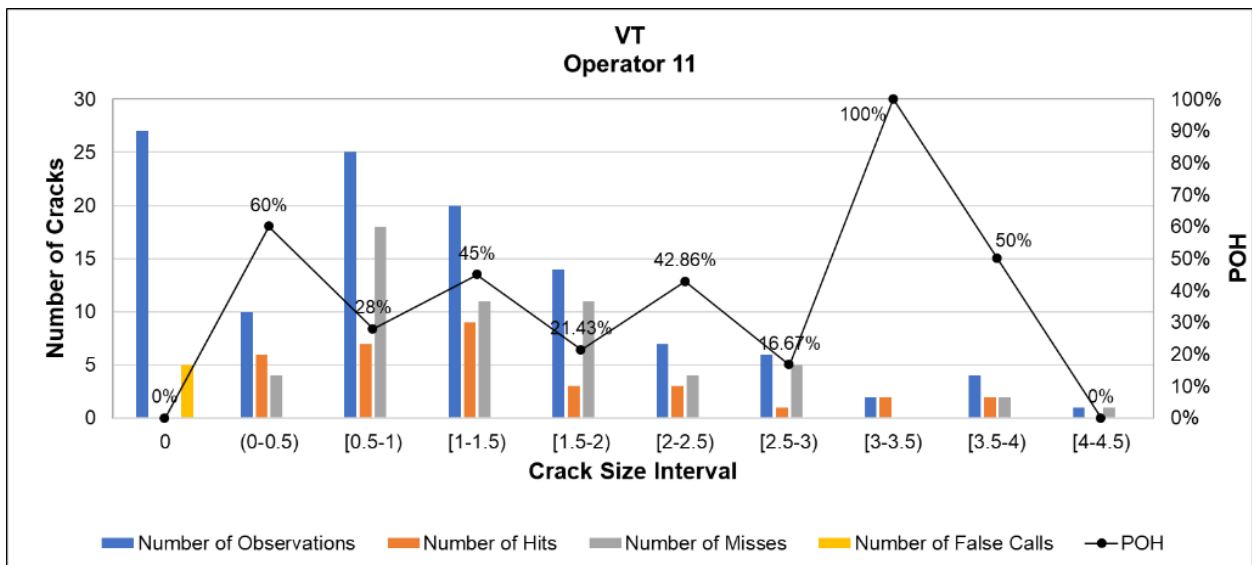


Figure 90. FW VT Distribution of Hits – Operator 11

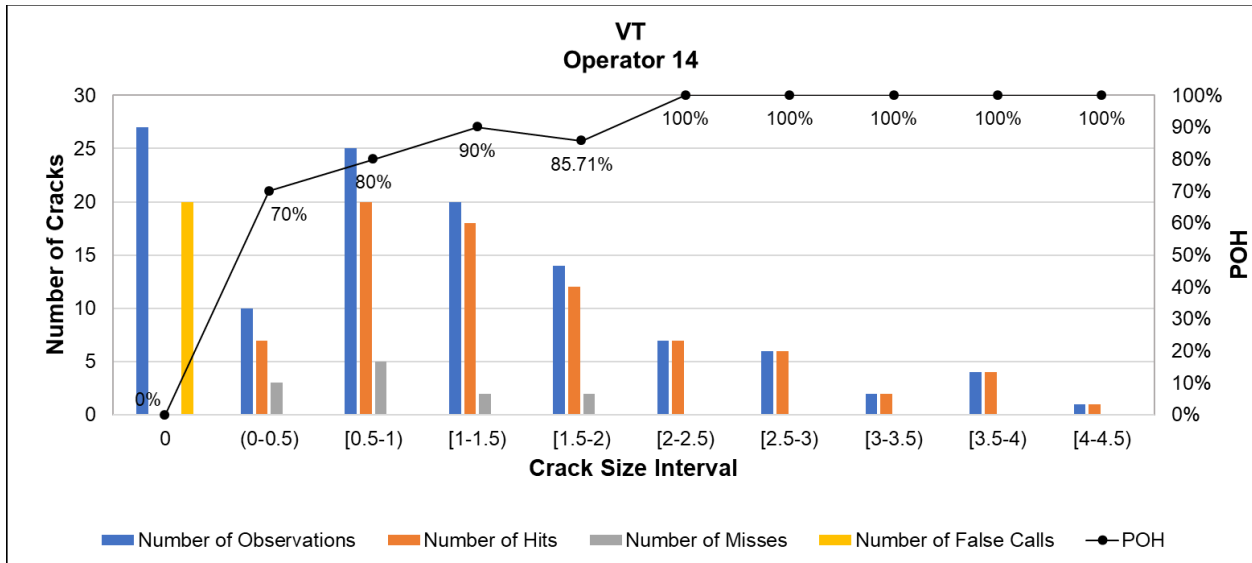


Figure 91. FW VT Distribution of Hits – Operator 14

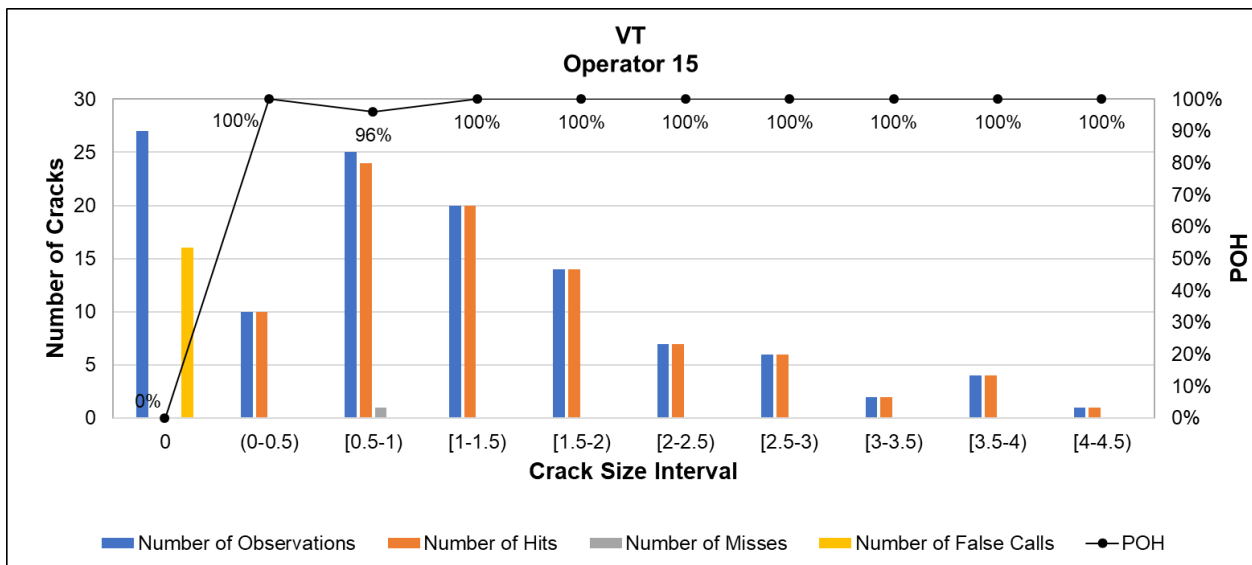


Figure 92. FW VT Distribution of Hits – Operator 15

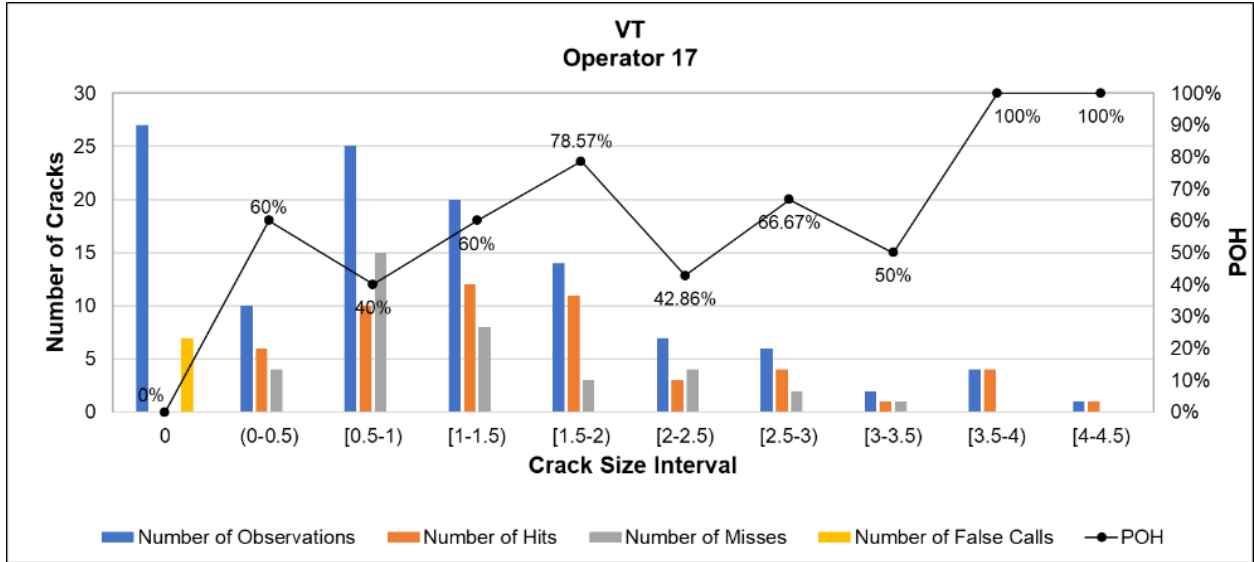


Figure 93. FW VT Distribution of Hits – Operator 17

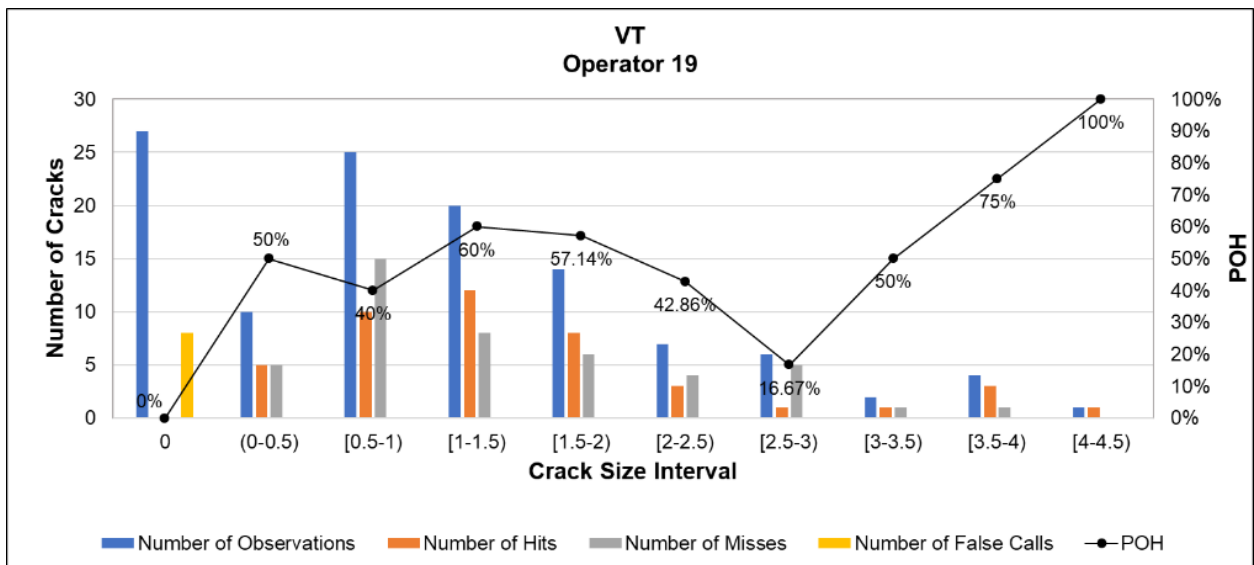


Figure 94. FW VT Distribution of Hits – Operator 19

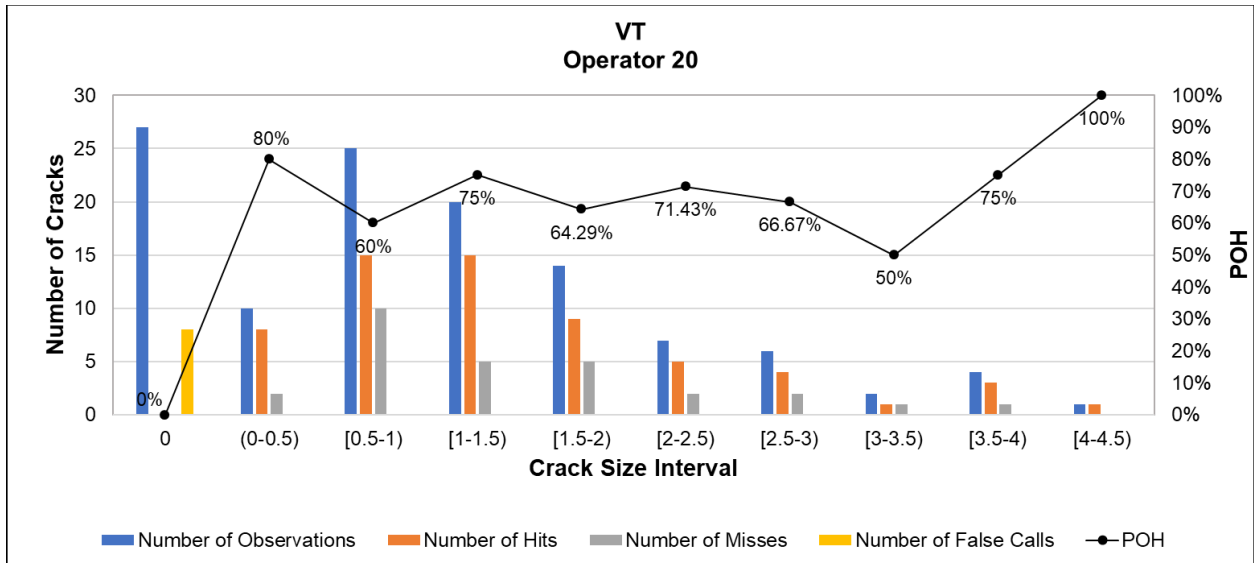


Figure 95. FW VT Distribution of Hits – Operator 20

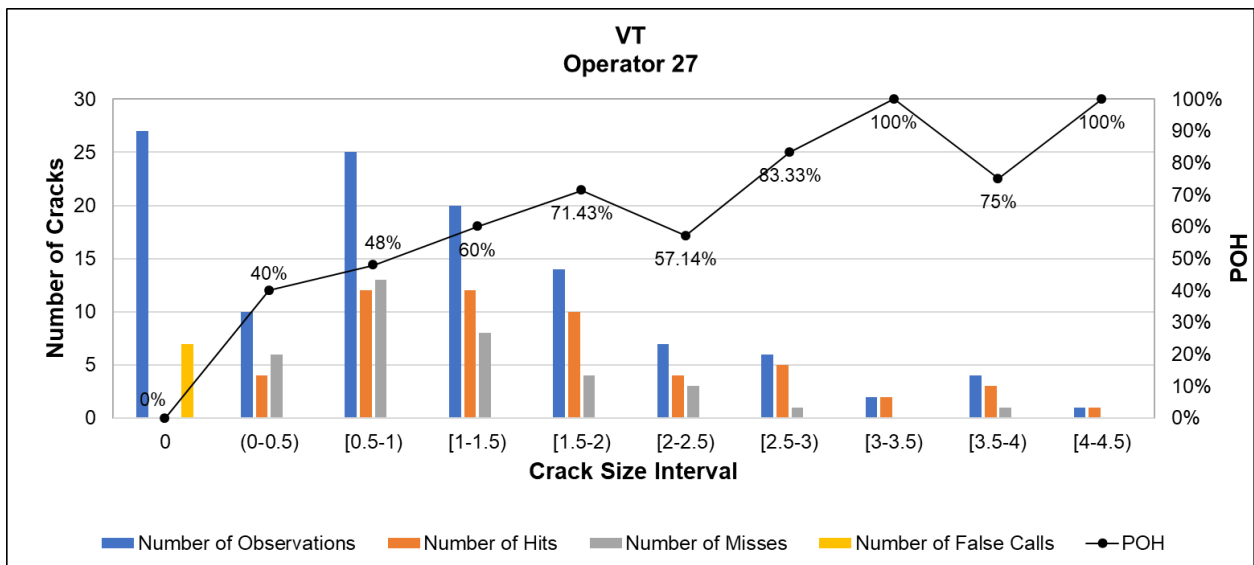


Figure 96. FW VT Distribution of Hits – Operator 27

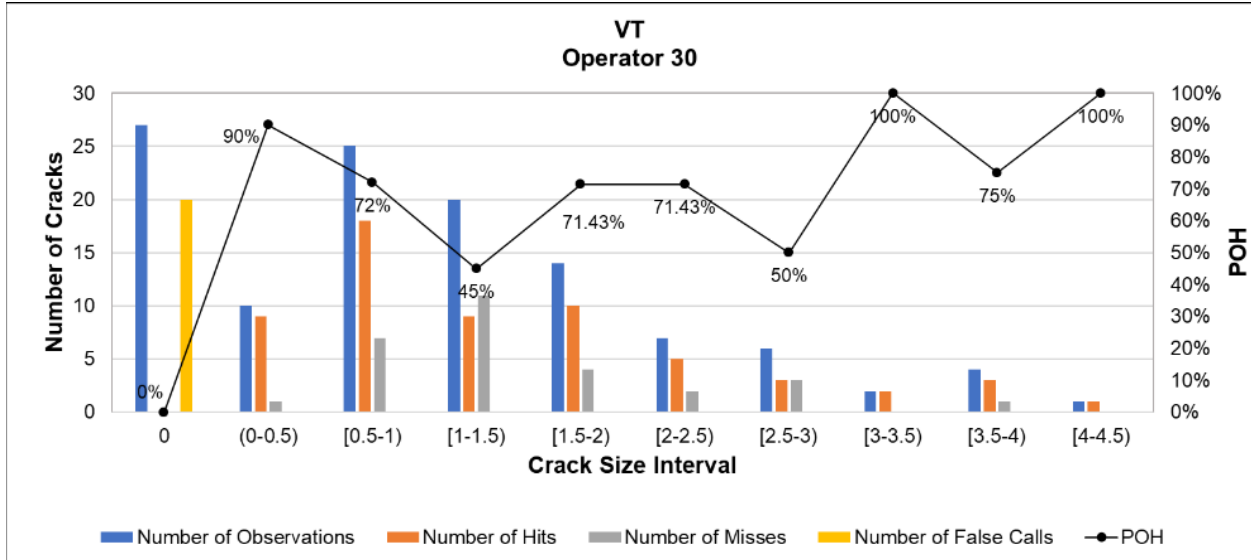


Figure 97. FW VT Distribution of Hits – Operator 30

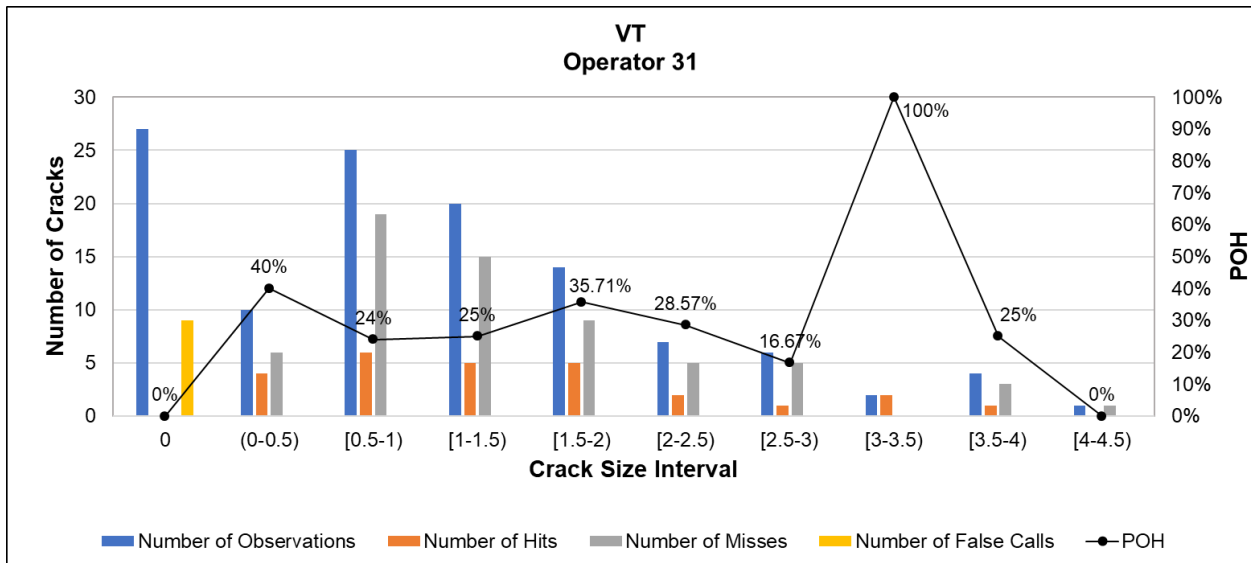


Figure 98. FW VT Distribution of Hits – Operator 31

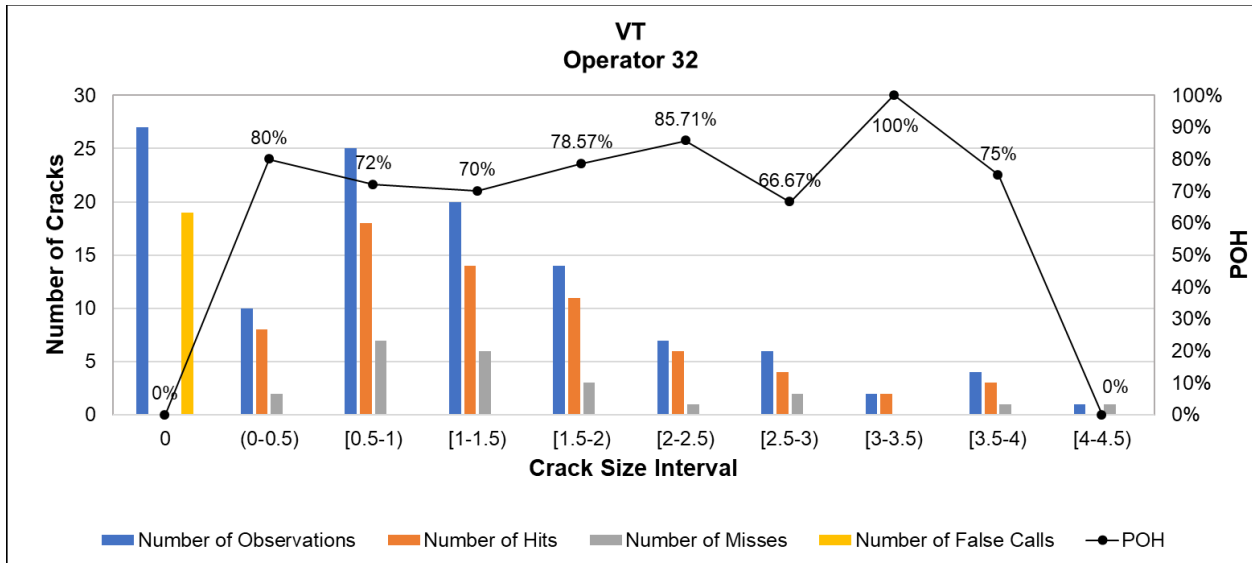


Figure 99. FW VT Distribution of Hits – Operator 32

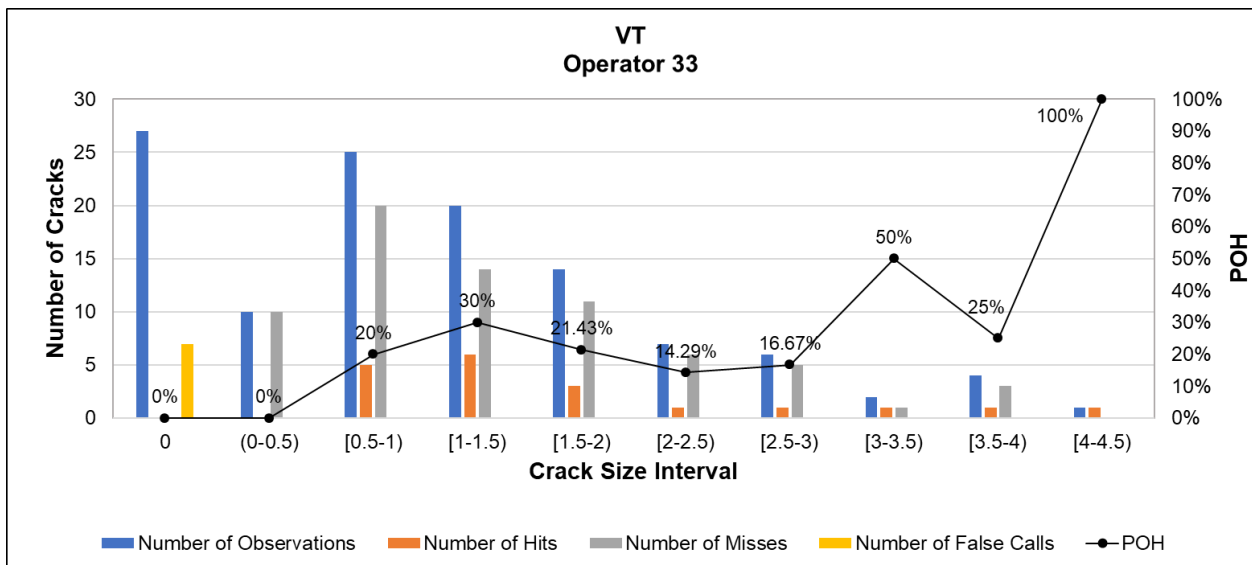


Figure 100. FW VT Distribution of Hits – Operator 33

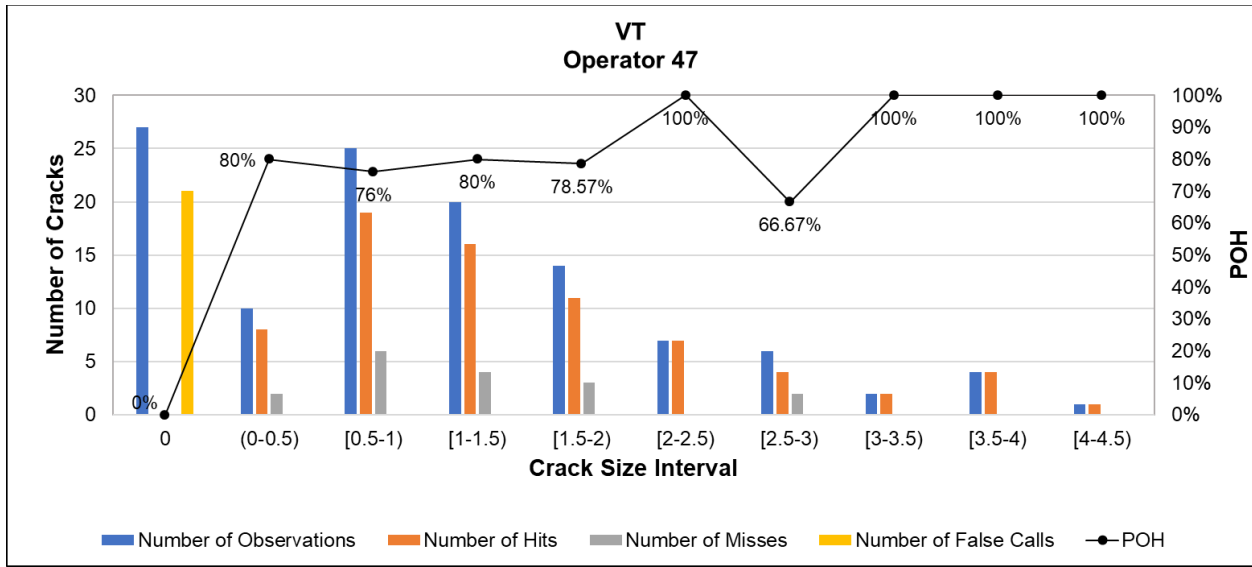


Figure 101. FW VT Distribution of Hits – Operator 47

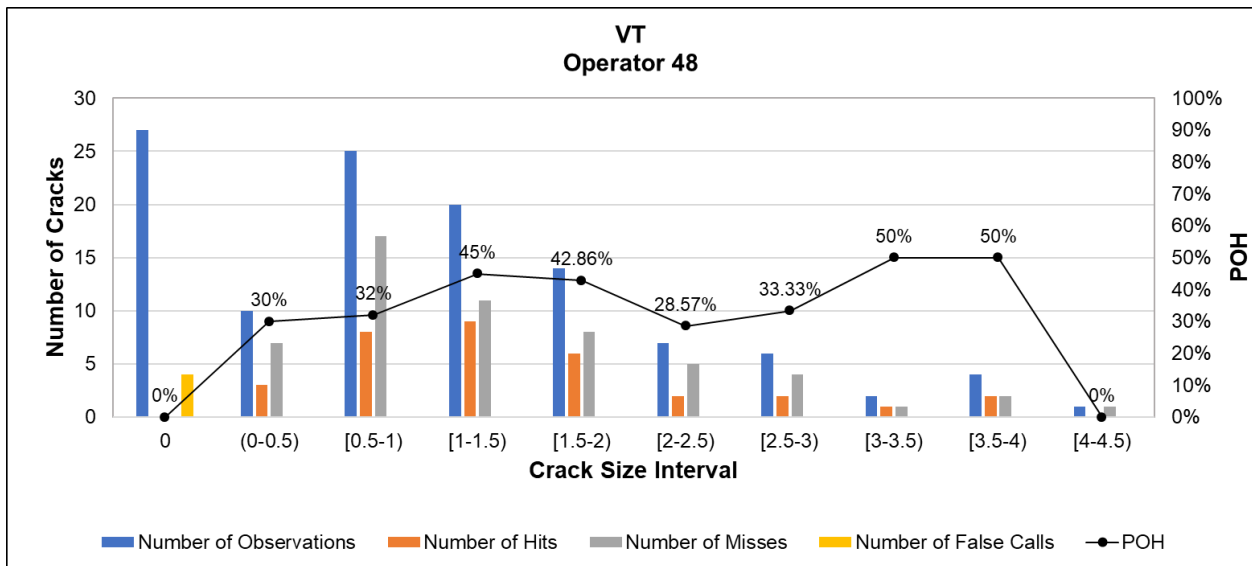


Figure 102. FW VT Distribution of Hits – Operator 48

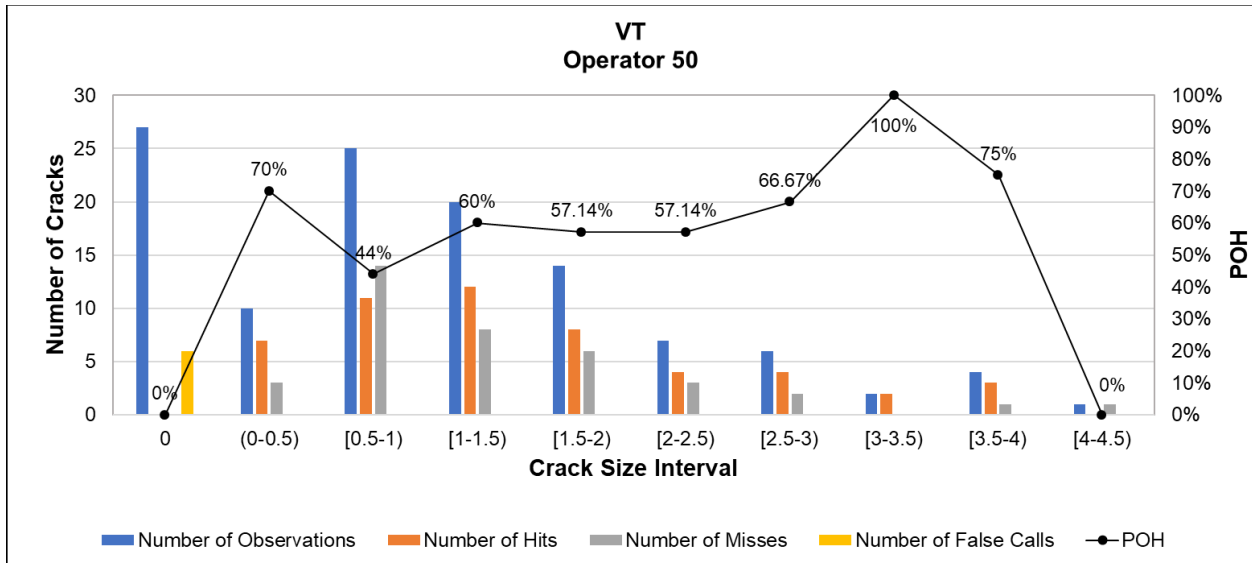


Figure 103. FW VT Distribution of Hits – Operator 50

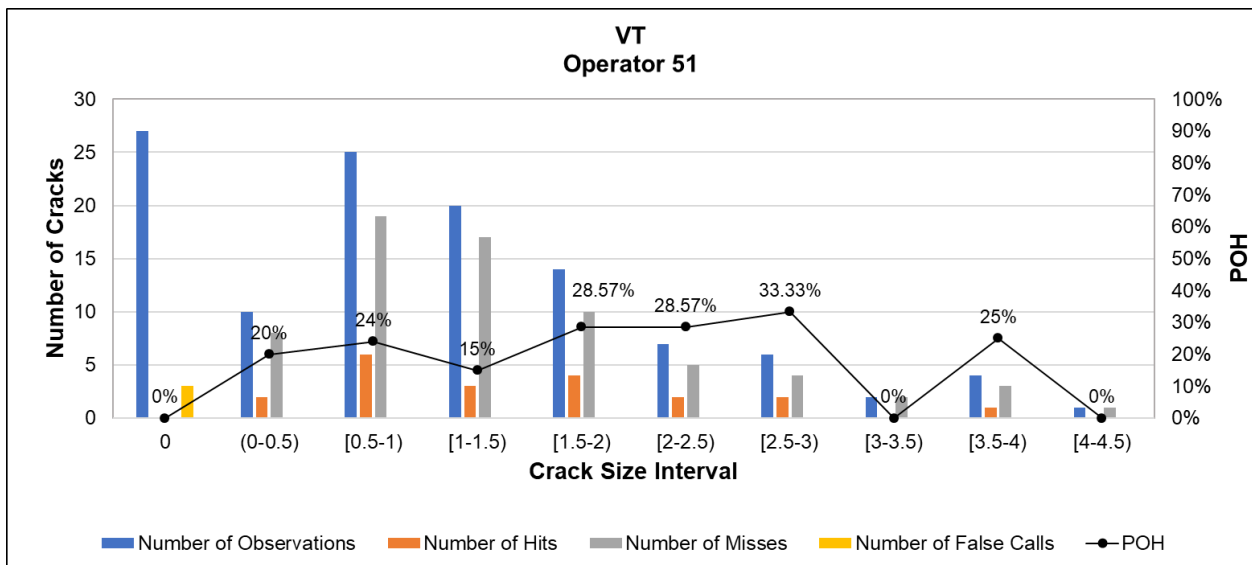


Figure 104. FW VT Distribution of Hits – Operator 51

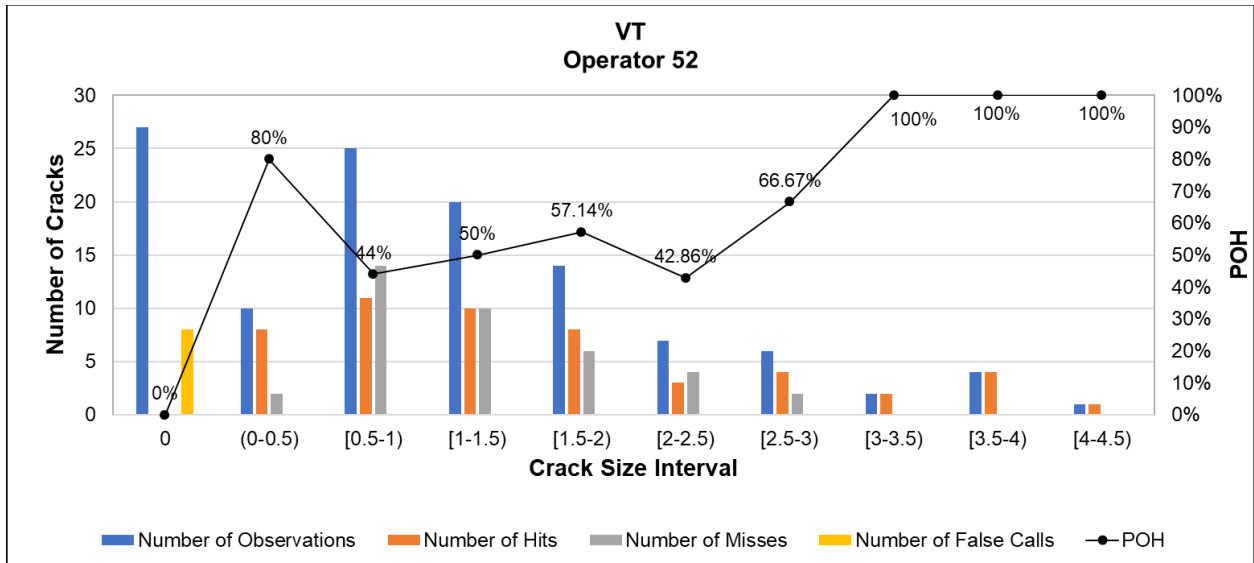


Figure 105. FW VT Distribution of Hits – Operator 52

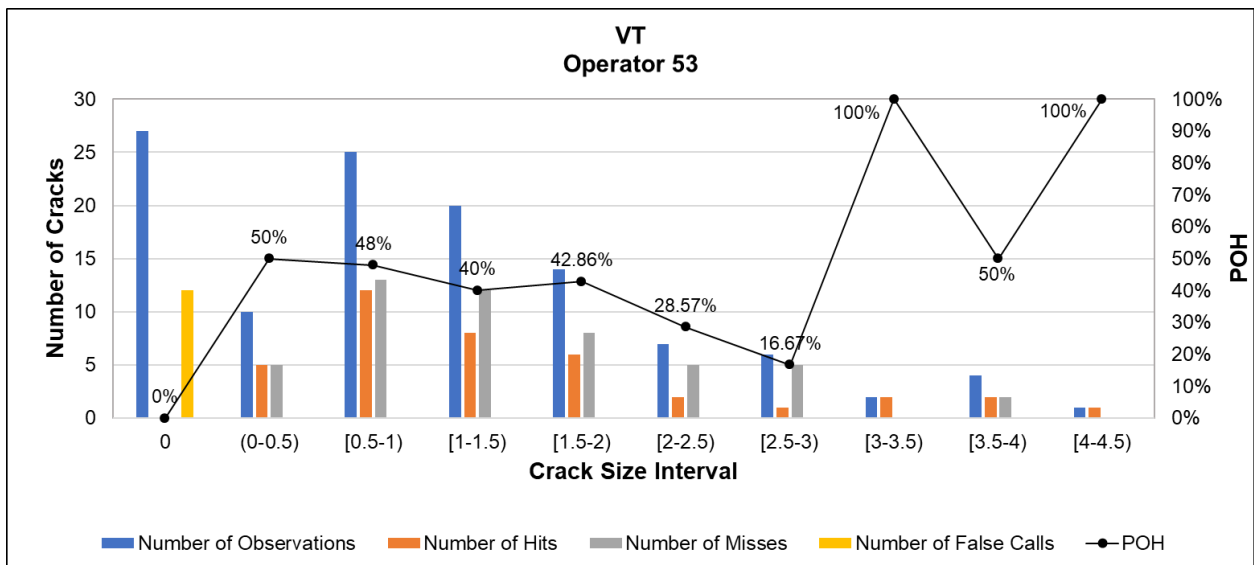


Figure 106. FW VT Distribution of Hits – Operator 53

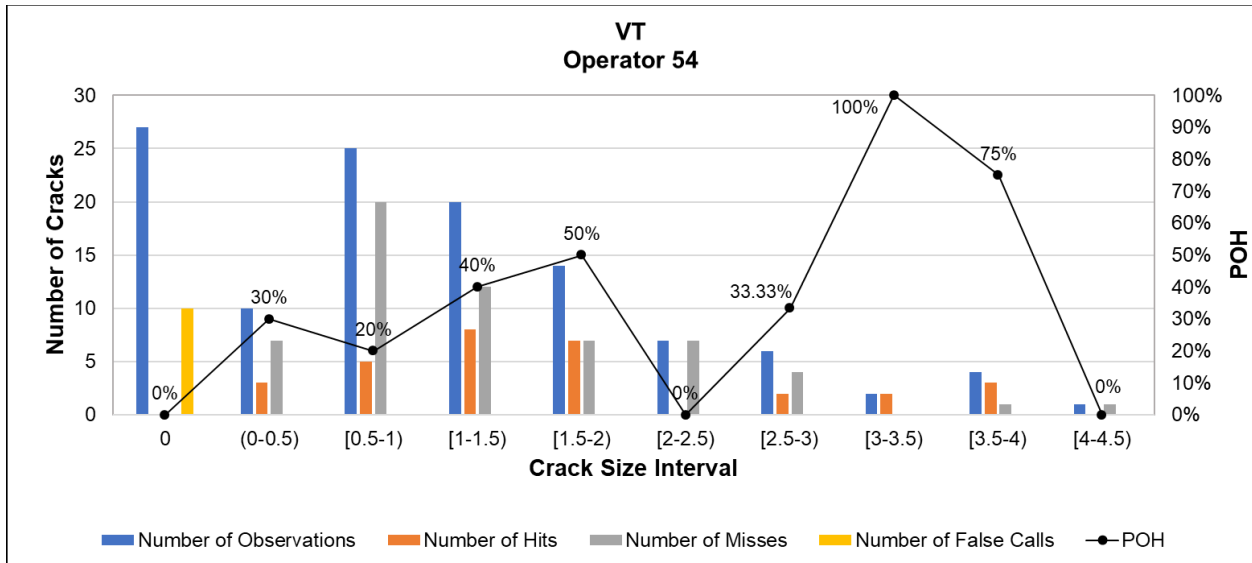


Figure 107. FW VT Distribution of Hits – Operator 54

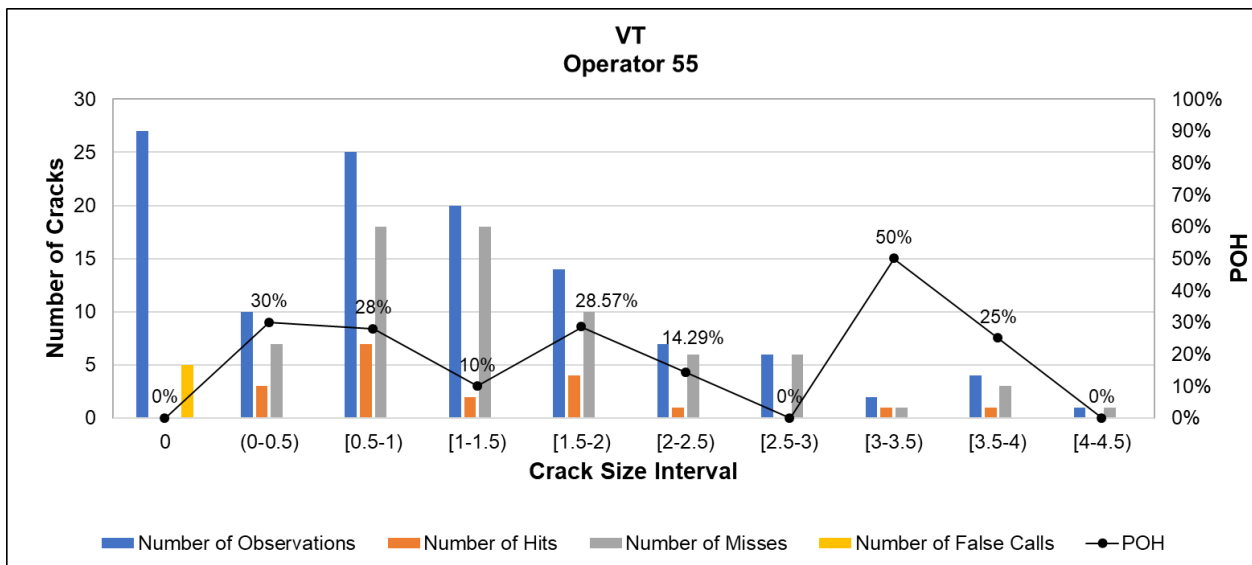


Figure 108. FW VT Distribution of Hits – Operator 55

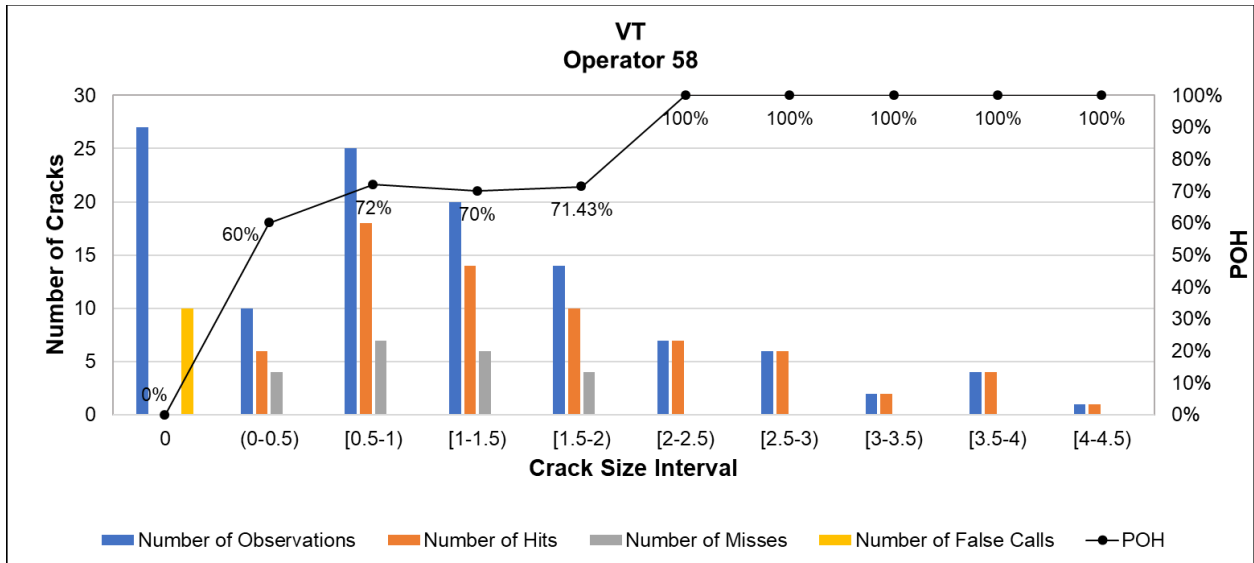


Figure 109. FW VT Distribution of Hits – Operator 58

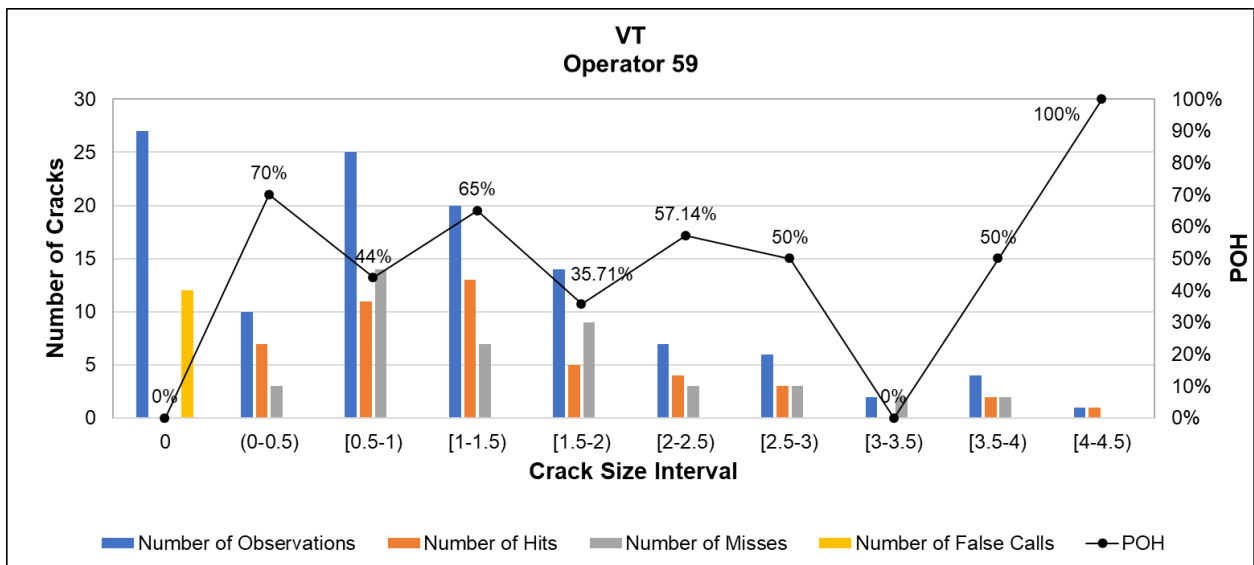


Figure 110. FW VT Distribution of Hits – Operator 59

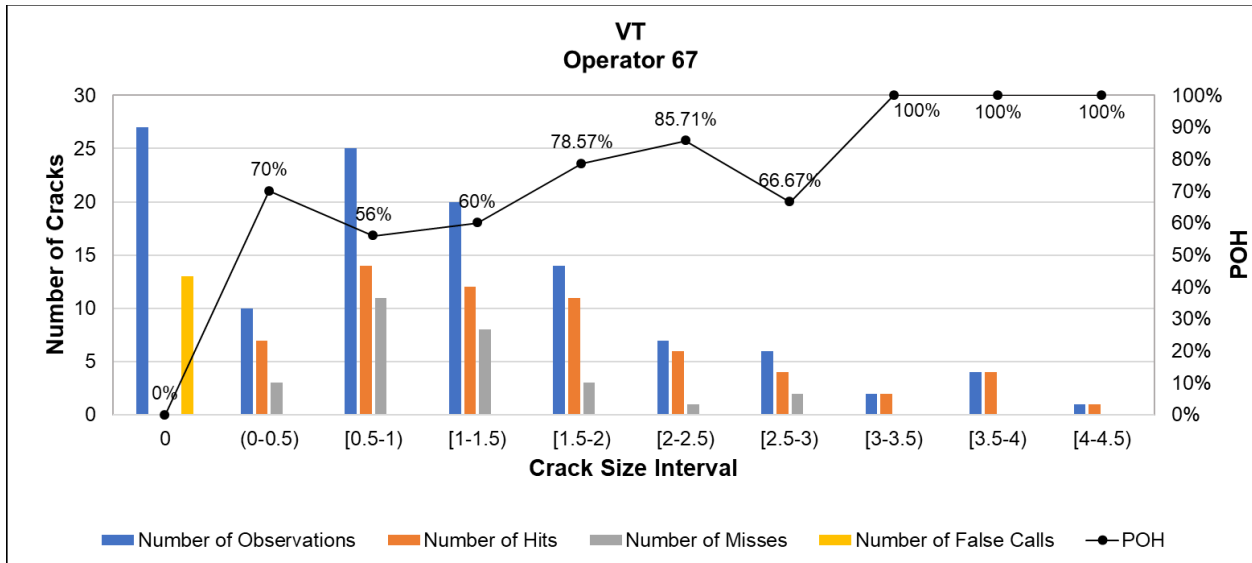


Figure 111. FW VT Distribution of Hits – Operator 67

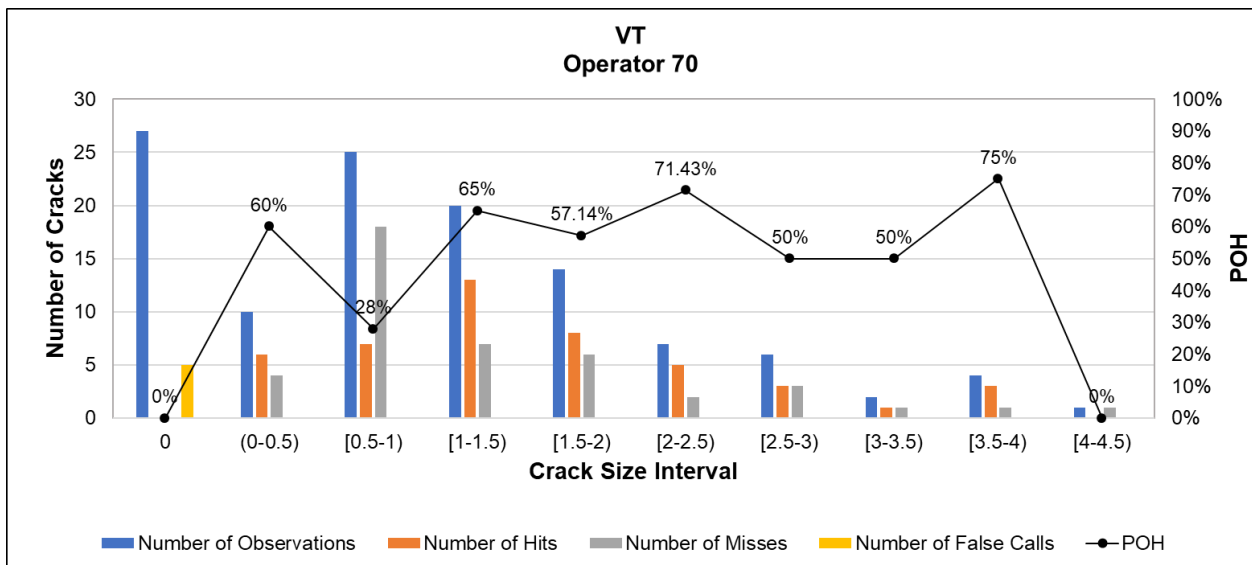


Figure 112. FW VT Distribution of Hits – Operator 70

Appendix D. Traditional Statistics POD Operator Graphs – Butt Welds

This appendix shows statistical POD operator graph-butt welds in [Figure 113](#) through [Figure 216](#).

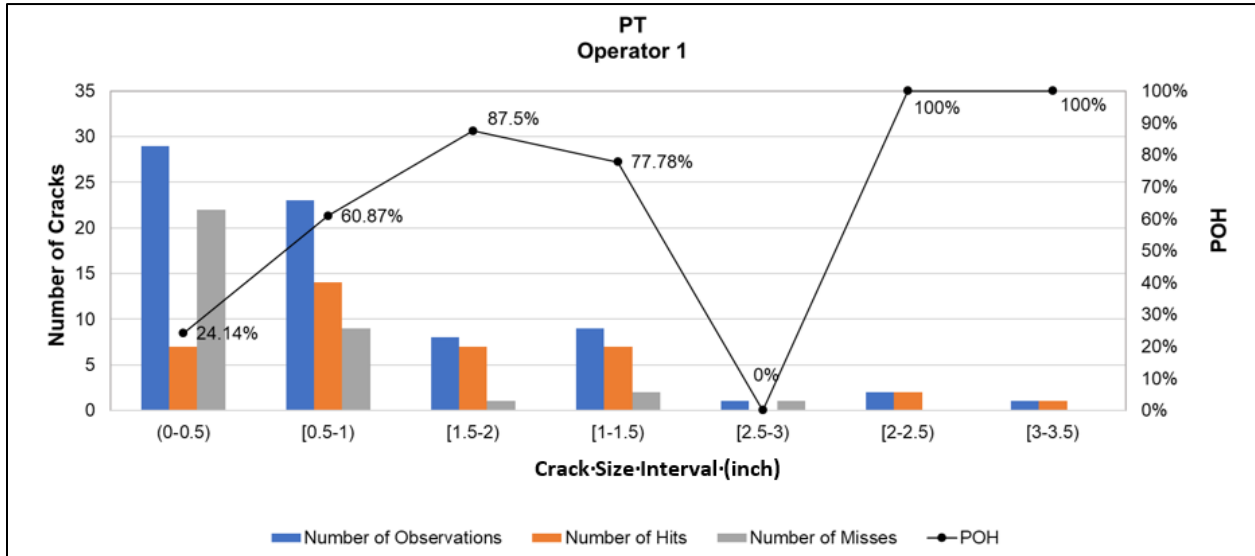


Figure 113. BW PT Distribution of Hits – Operator 1

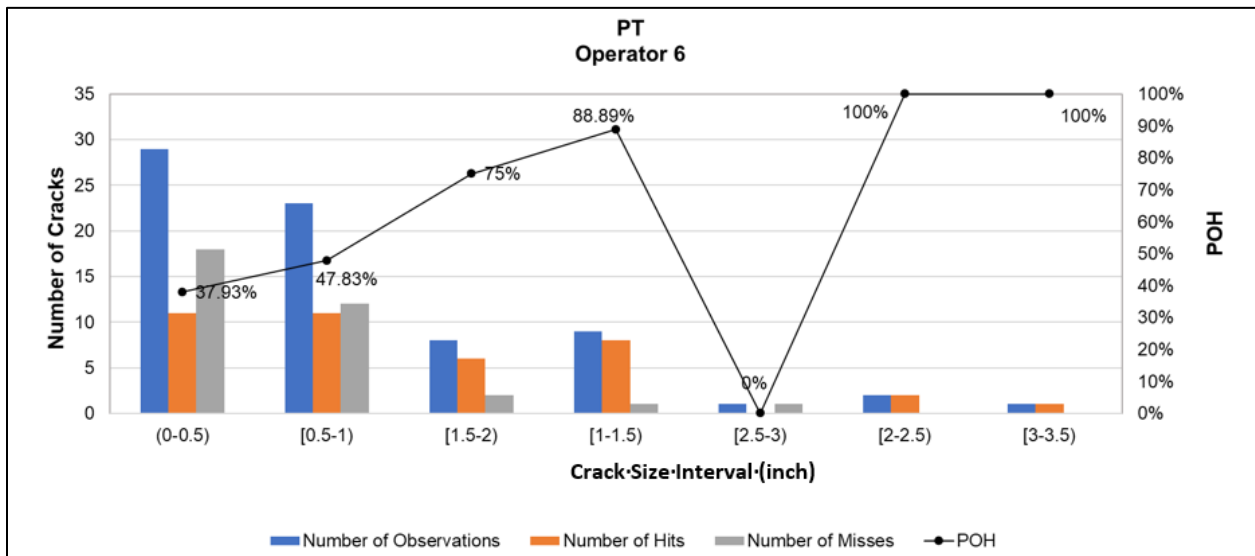


Figure 114. BW PT Distribution of Hits – Operator 6

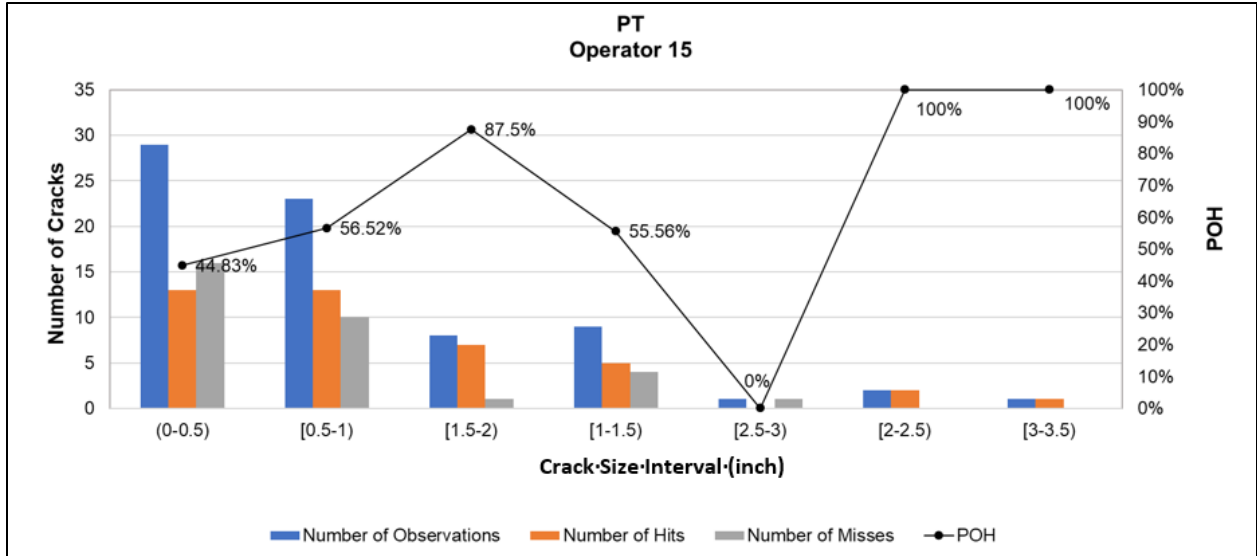


Figure 115. BW PT Distribution of Hits – Operator 15

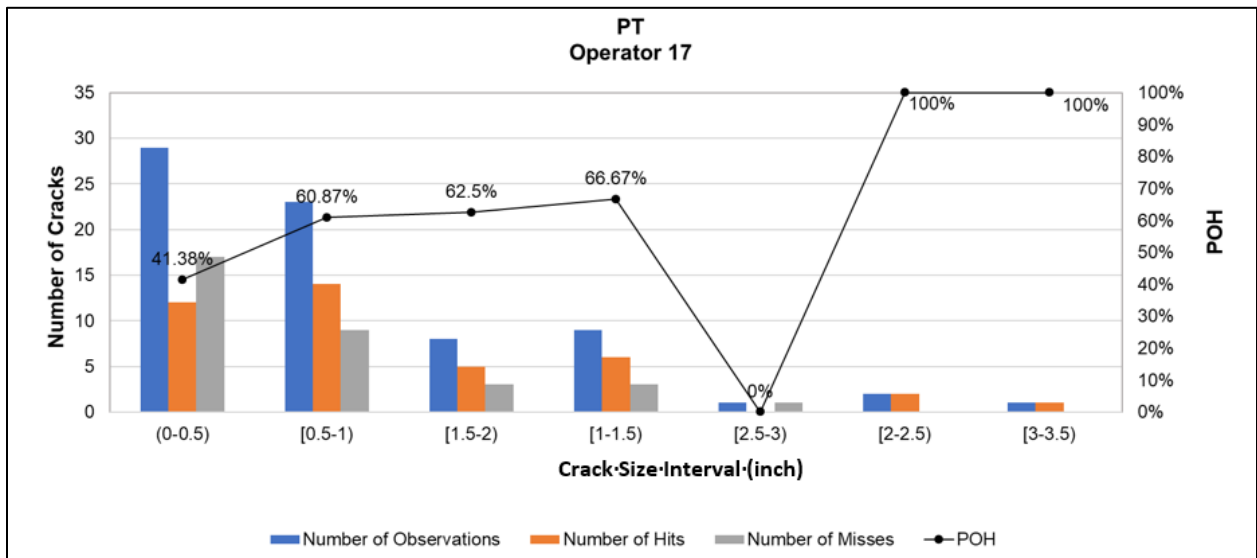


Figure 116. BW PT Distribution of Hits – Operator 17

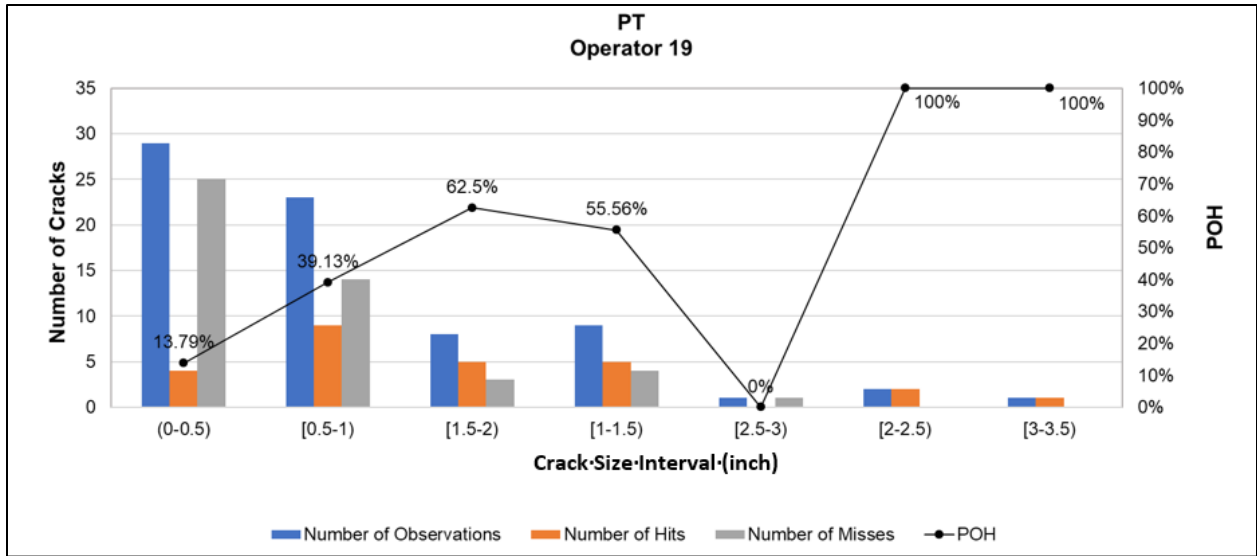


Figure 117. BW PT Distribution of Hits – Operator 19

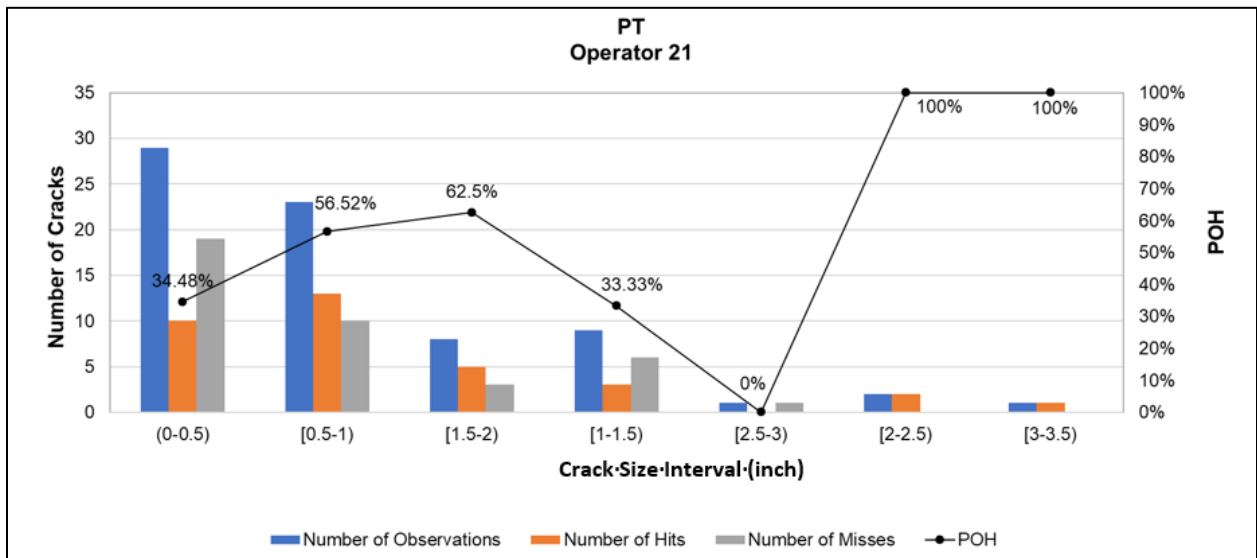


Figure 118. BW PT Distribution of Hits – Operator 21

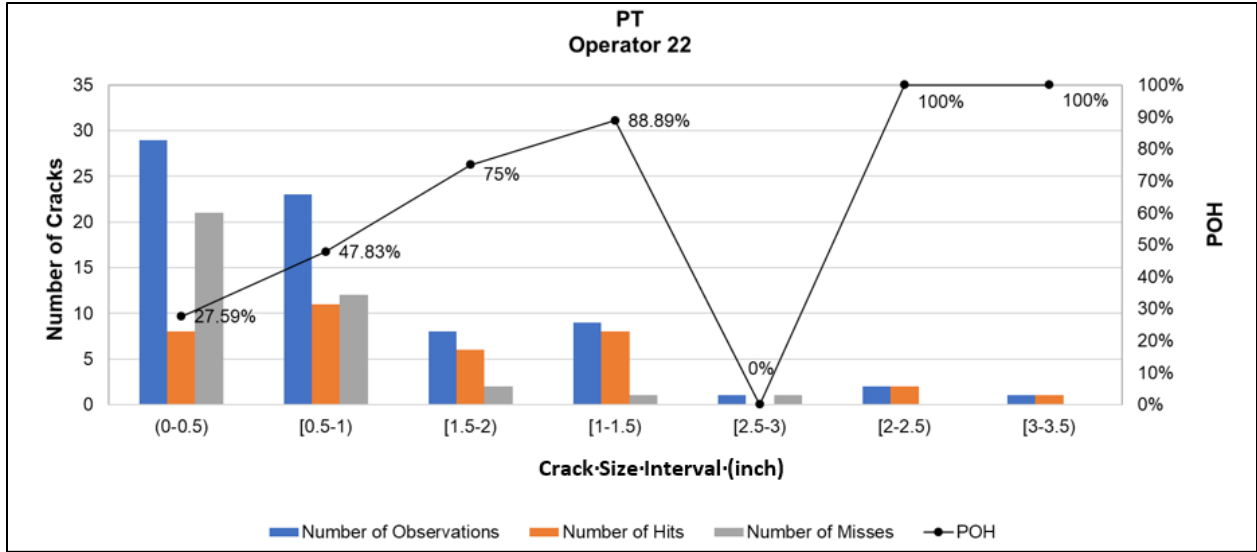


Figure 119. BW PT Distribution of Hits – Operator 22

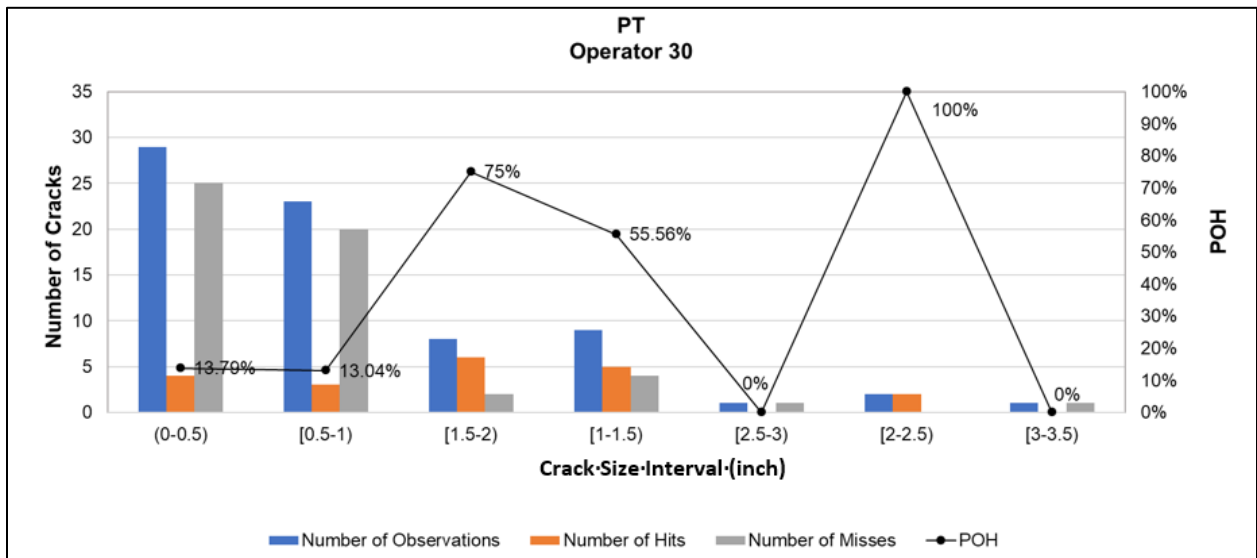


Figure 120. BW PT Distribution of Hits – Operator 30

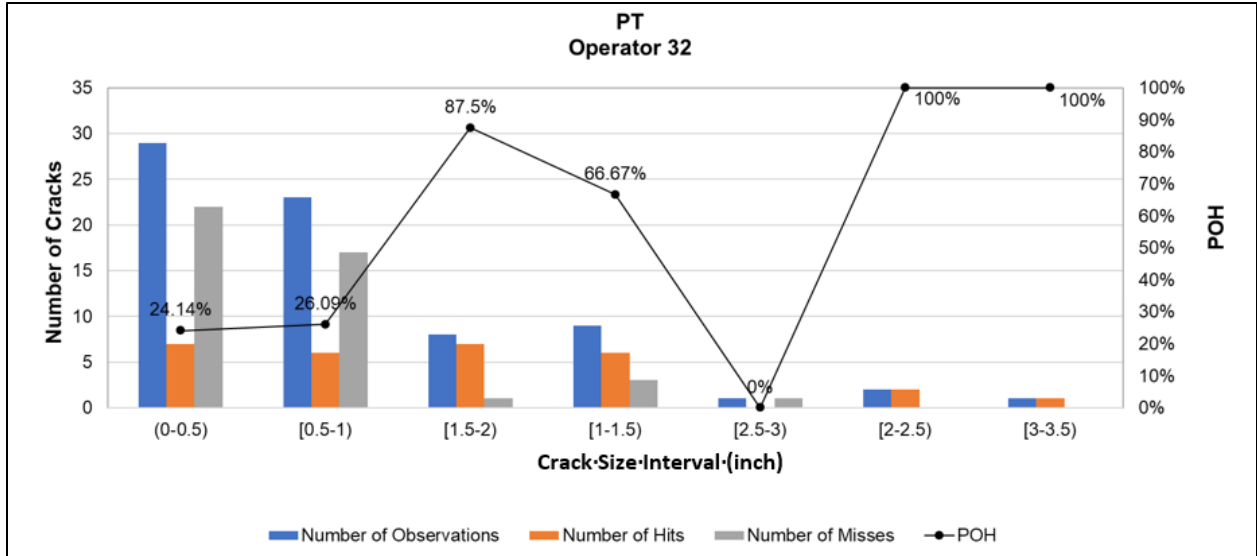


Figure 121. BW PT Distribution of Hits – Operator 32

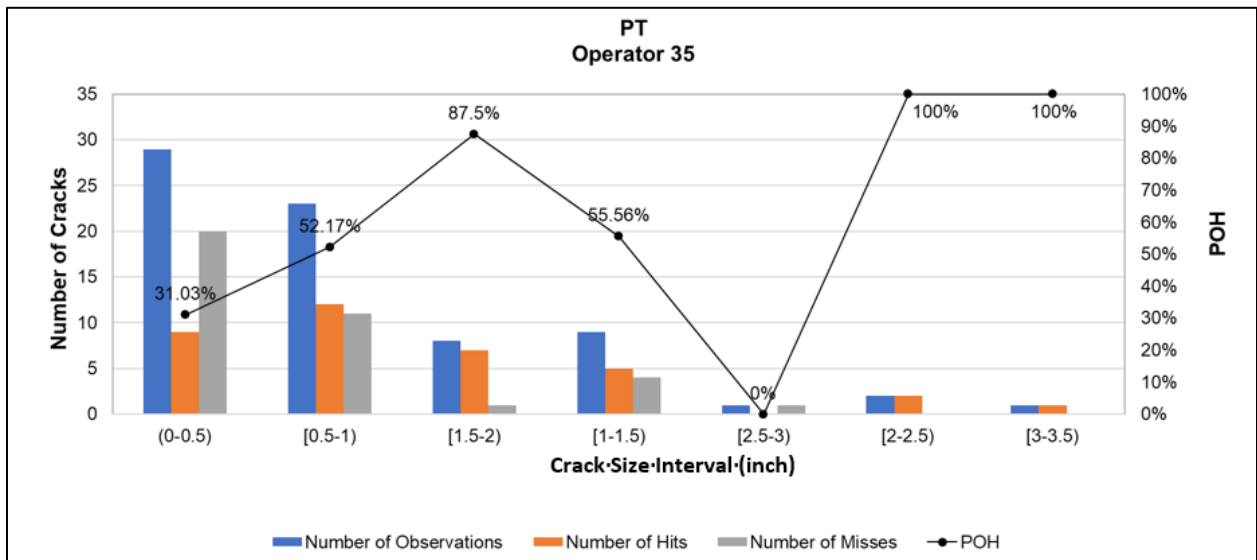


Figure 122. BW PT Distribution of Hits – Operator 35

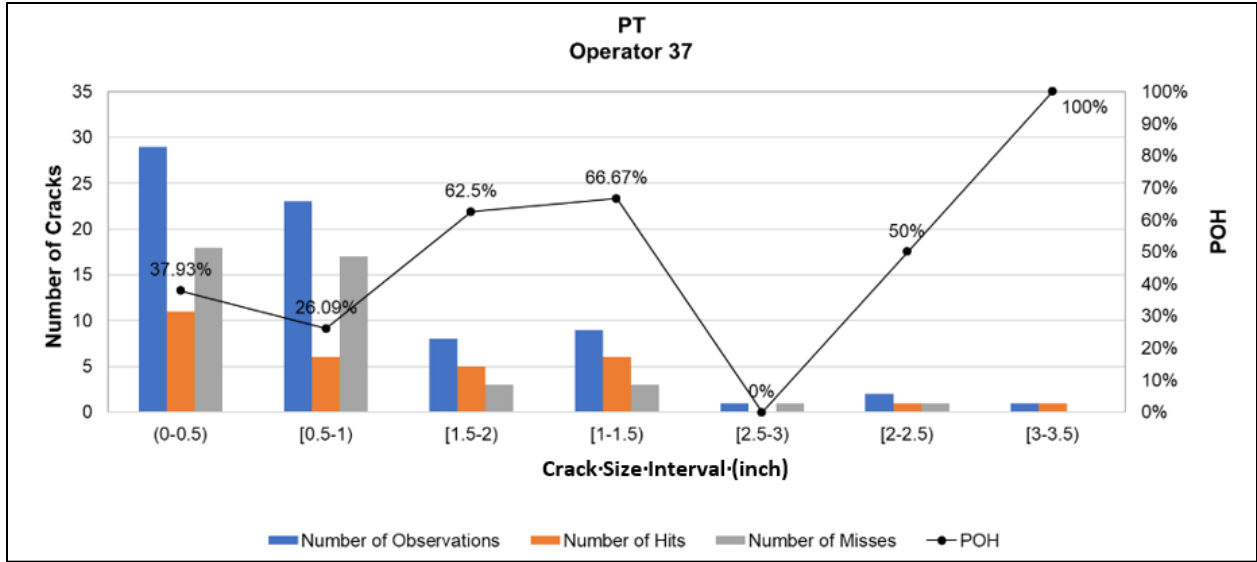


Figure 123. BW PT Distribution of Hits – Operator 37

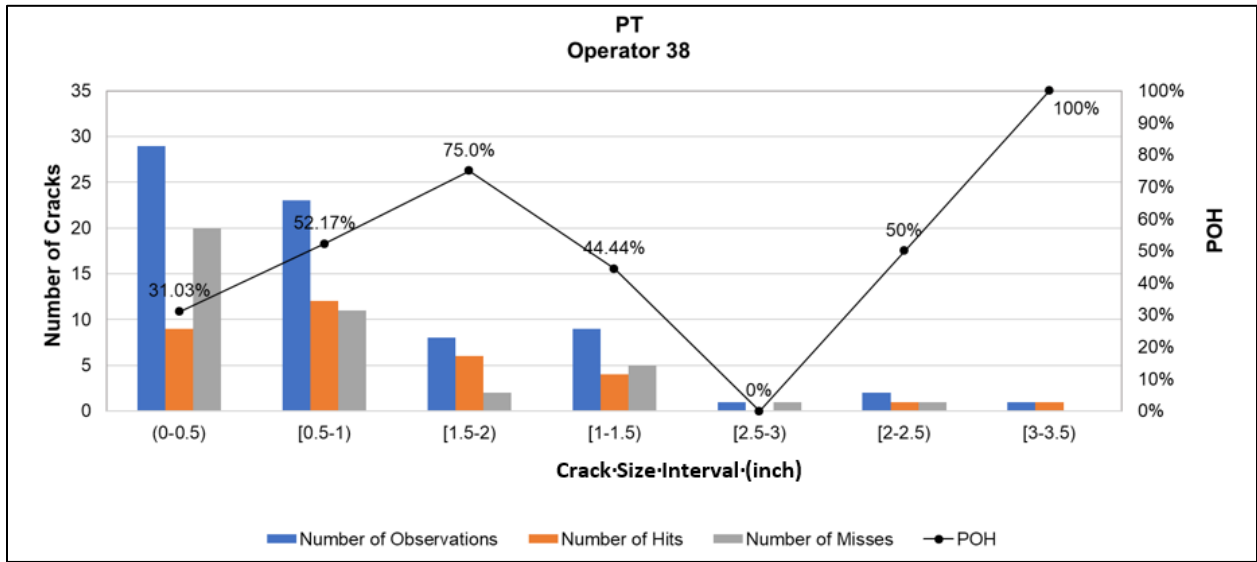


Figure 124. BW PT Distribution of Hits – Operator 38

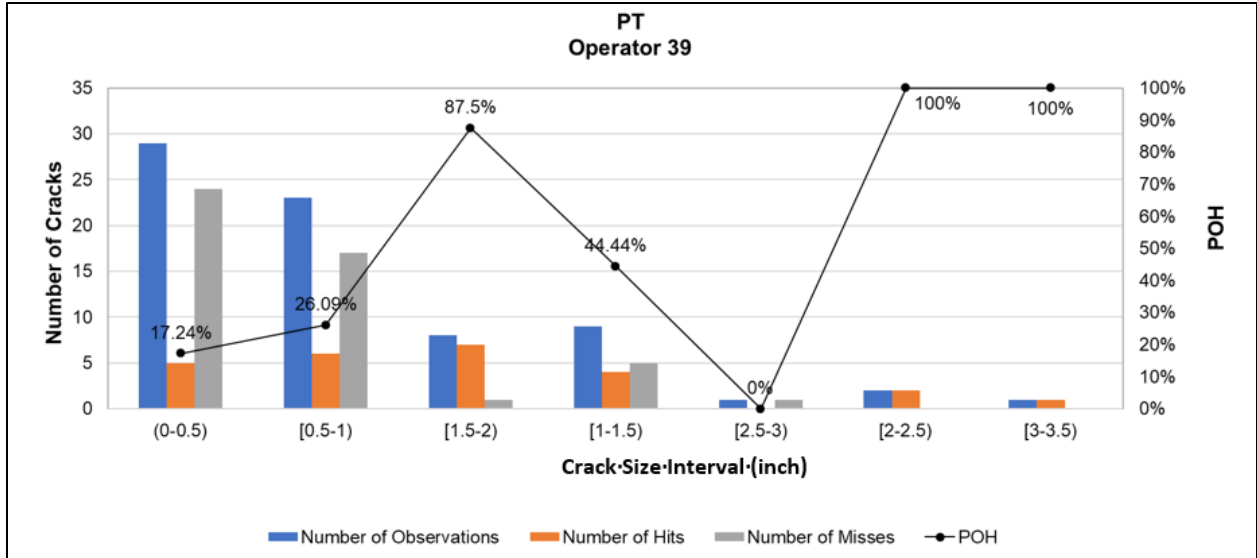


Figure 125. BW PT Distribution of Hits – Operator 39

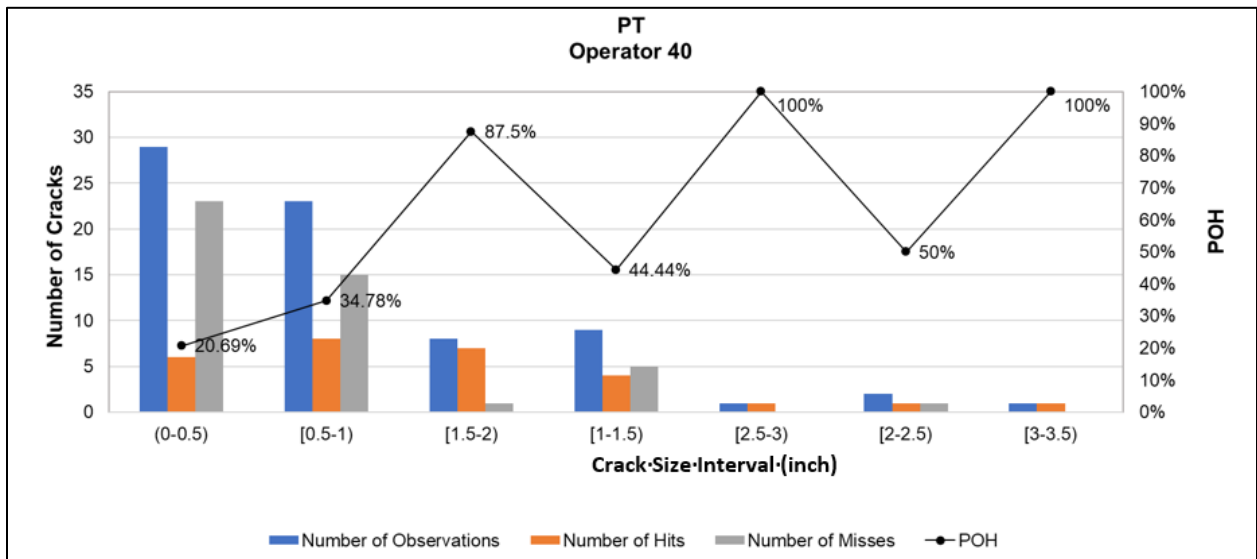


Figure 126. BW PT Distribution of Hits – Operator 40

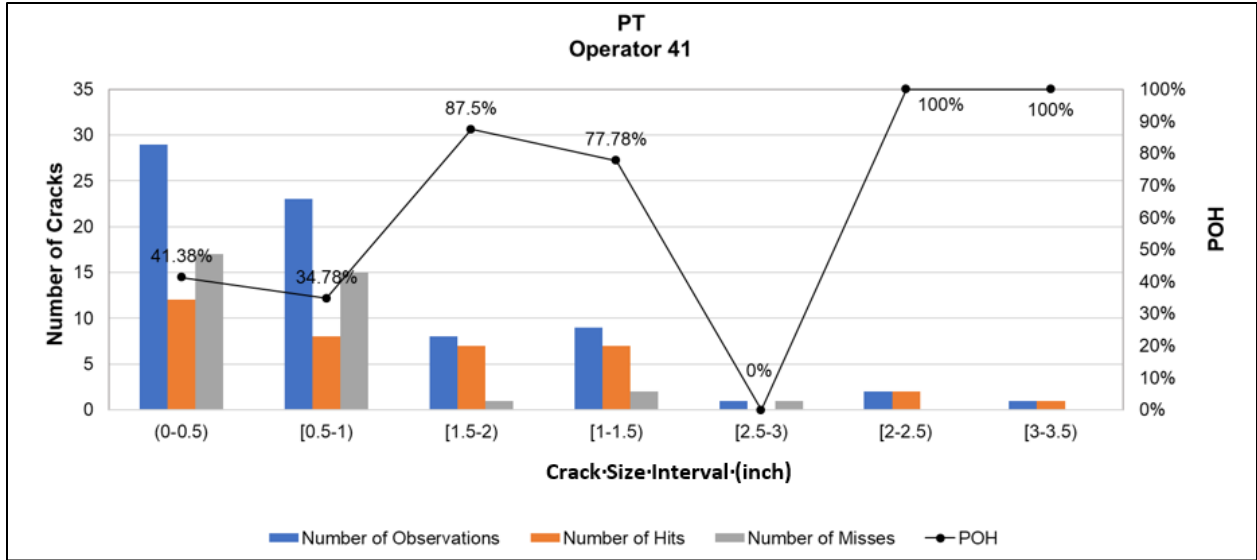


Figure 127. BW PT Distribution of Hits – Operator 41

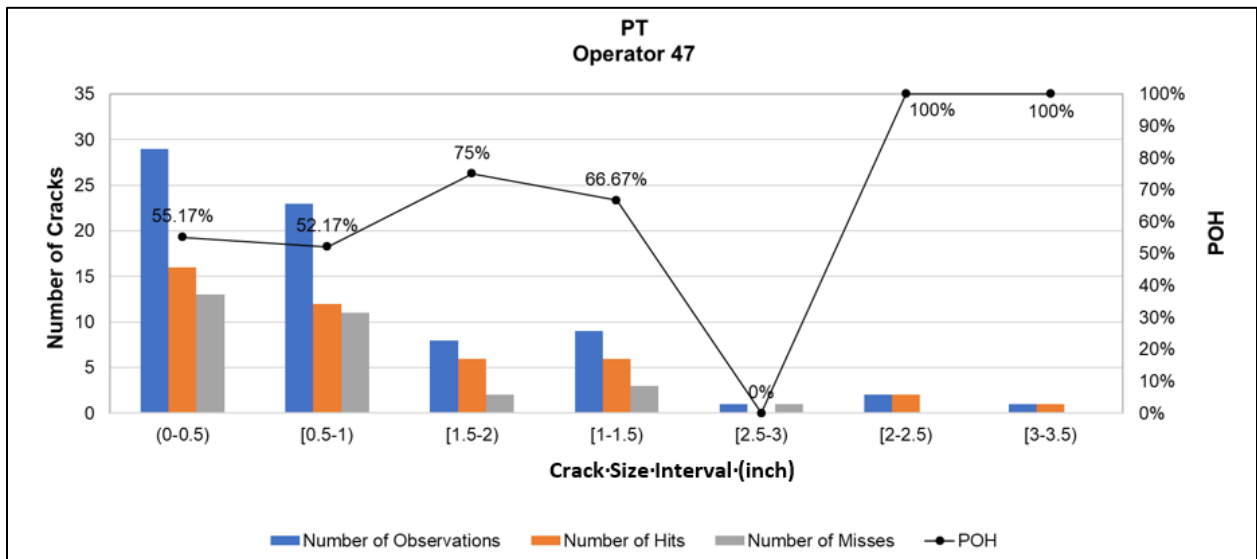


Figure 128. BW PT Distribution of Hits – Operator 47

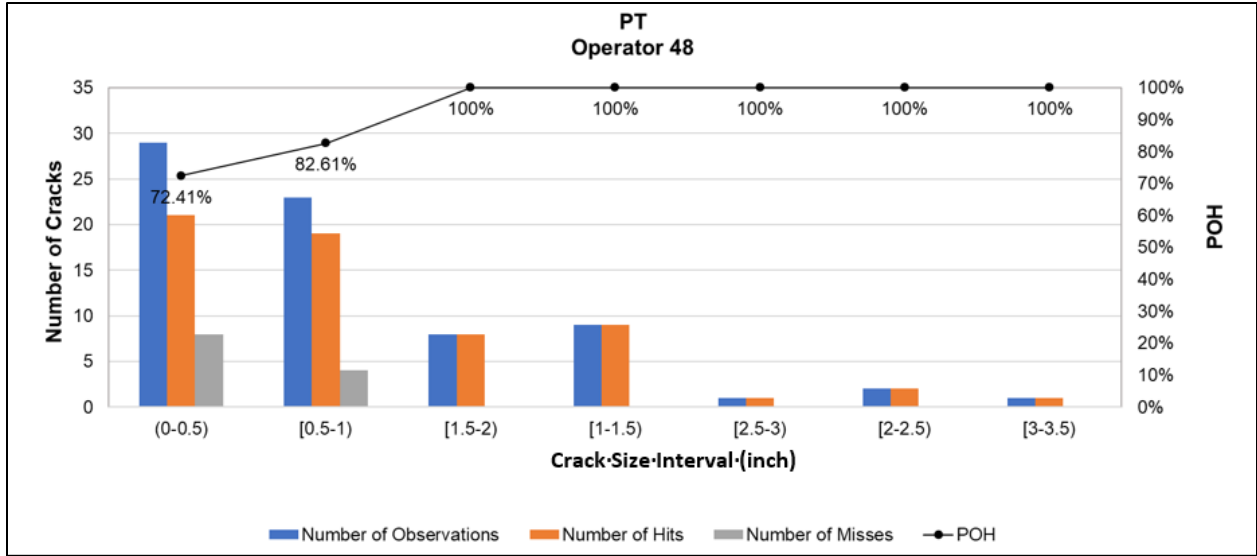


Figure 129. BW PT Distribution of Hits – Operator 48

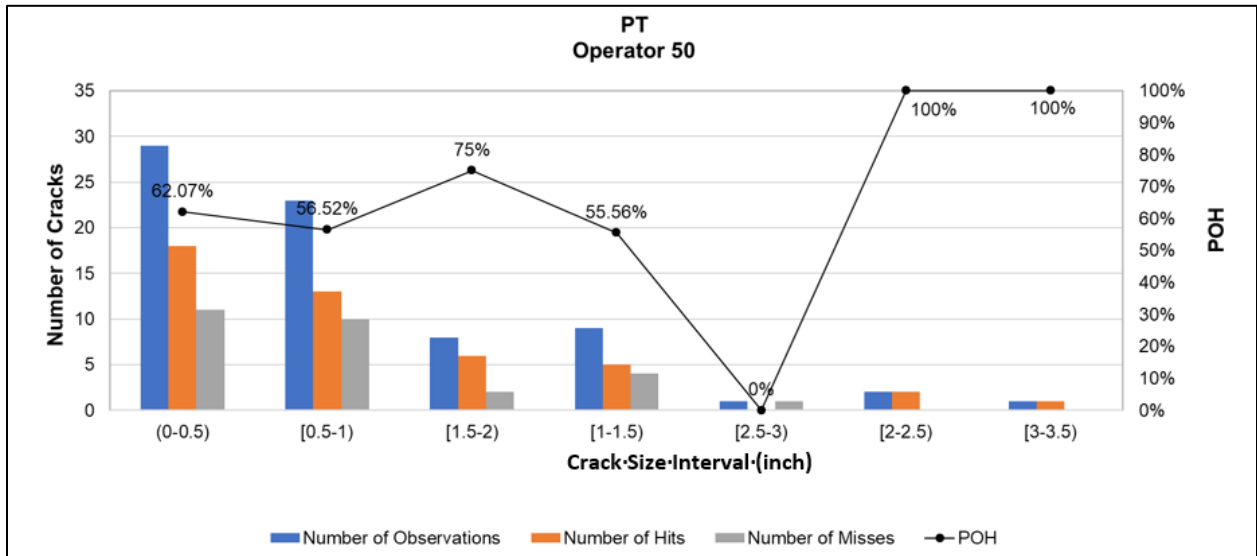


Figure 130. BW PT Distribution of Hits – Operator 50

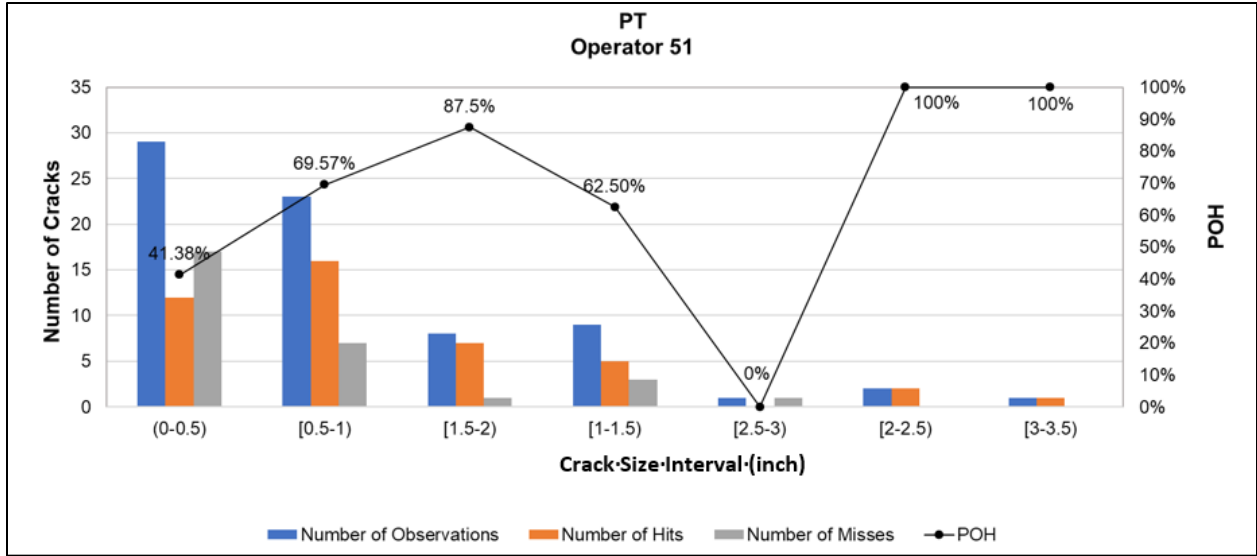


Figure 131. BW PT Distribution of Hits – Operator 51

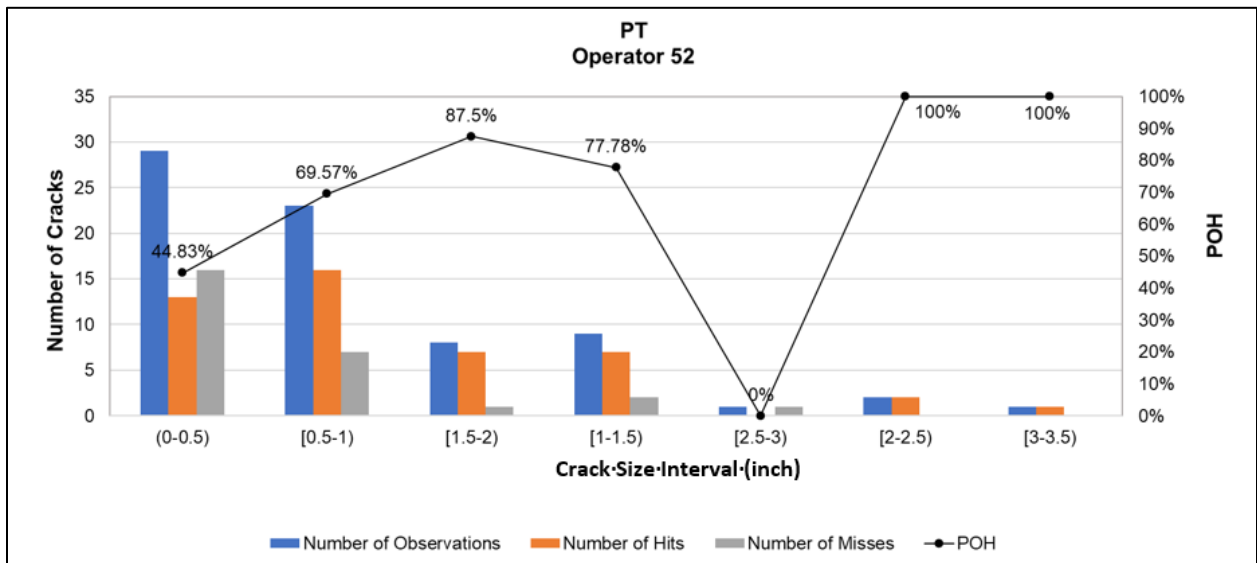


Figure 132. BW PT Distribution of Hits – Operator 52

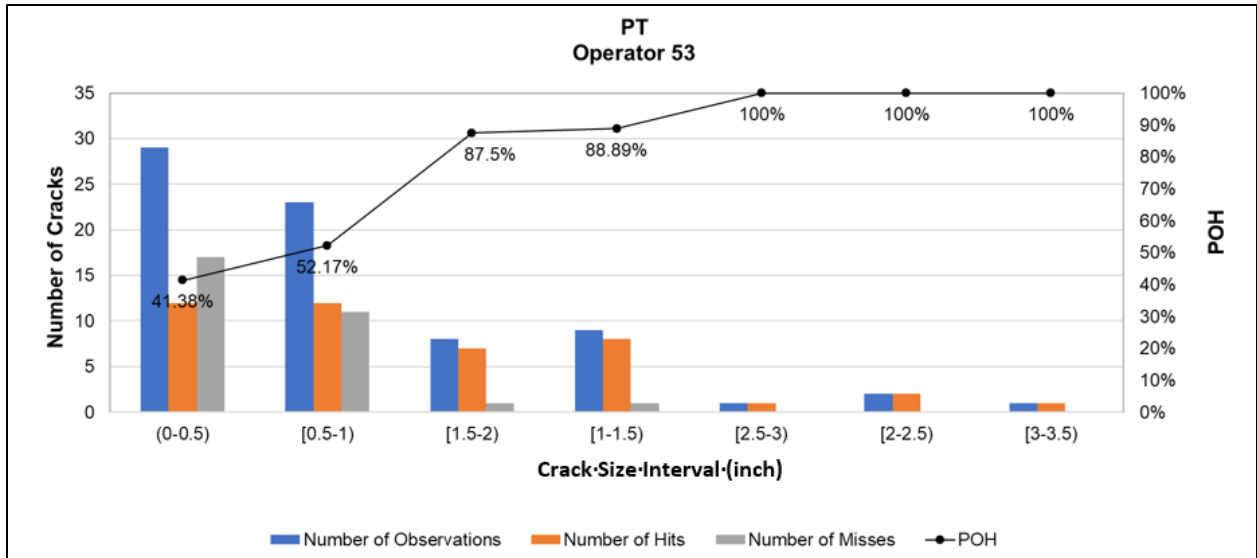


Figure 133. BW PT Distribution of Hits – Operator 53

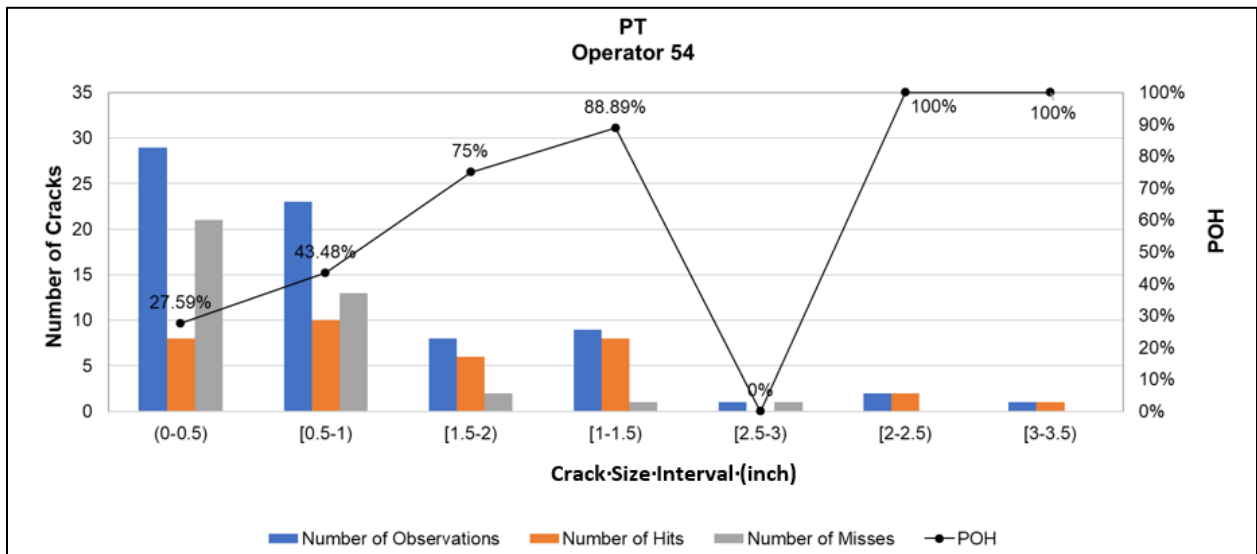


Figure 134. BW PT Distribution of Hits – Operator 54

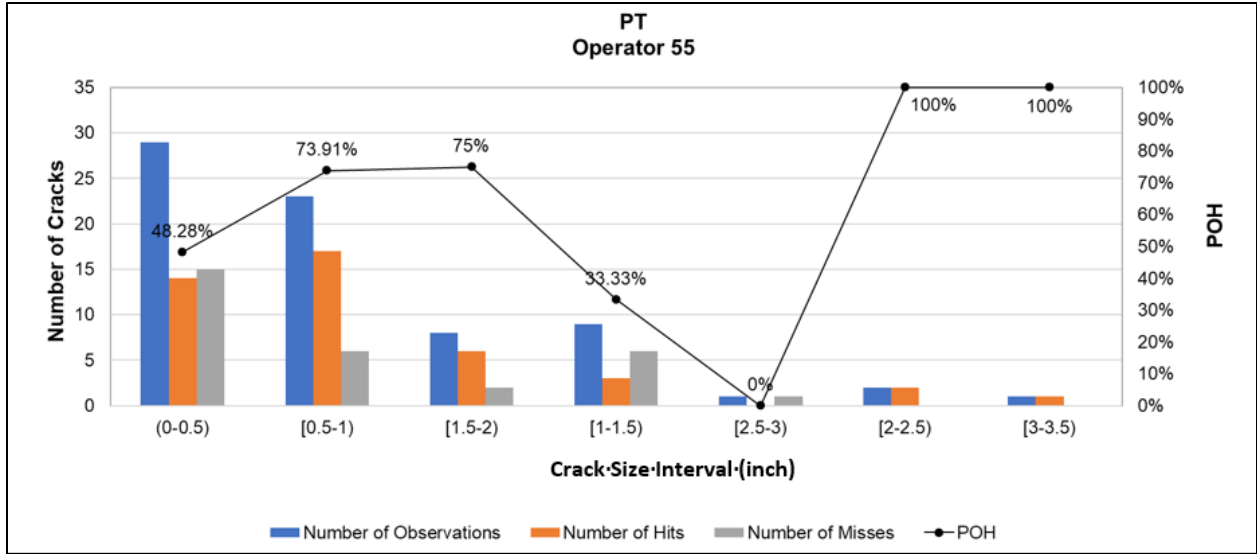


Figure 135. BW PT Distribution of Hits – Operator 55

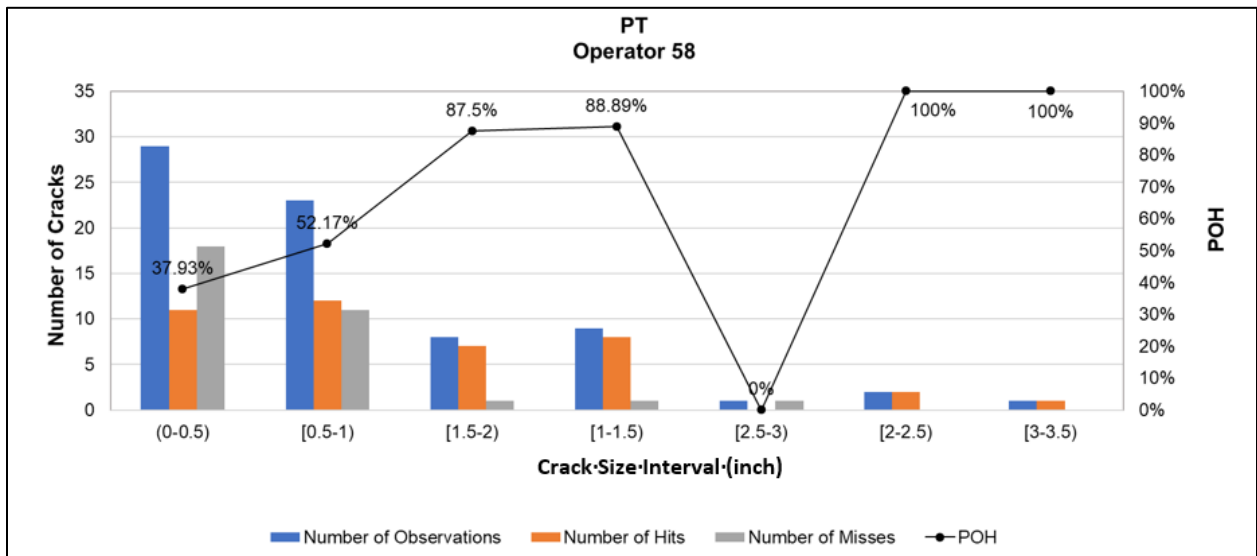


Figure 136. BW PT Distribution of Hits – Operator 58

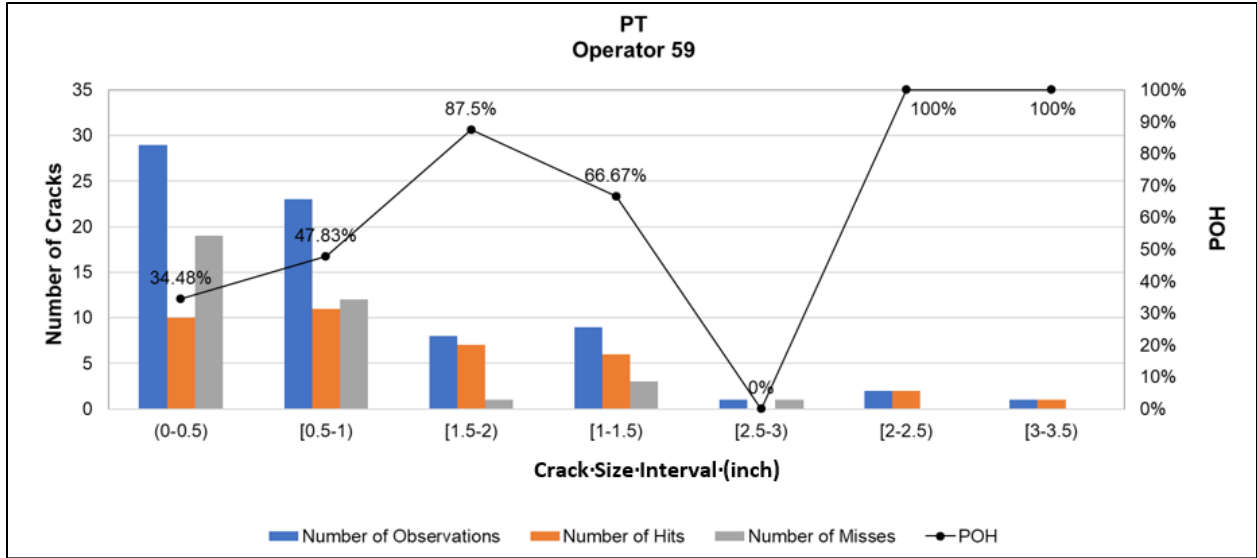


Figure 137. BW PT Distribution of Hits – Operator 59

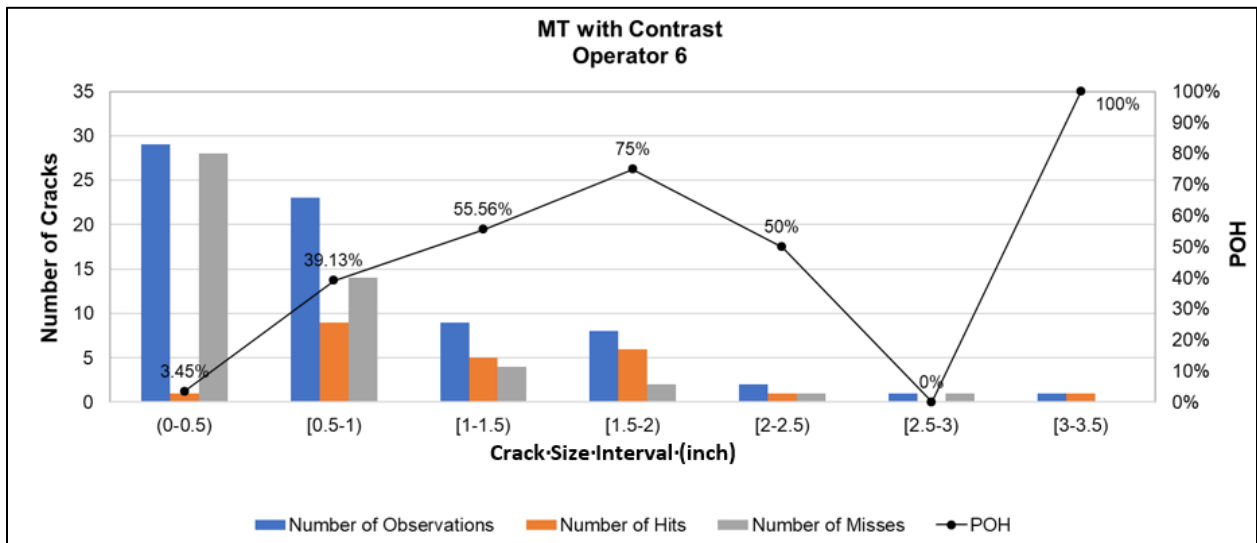


Figure 138. BW MT with Contrast Distribution of Hits – Operator 6

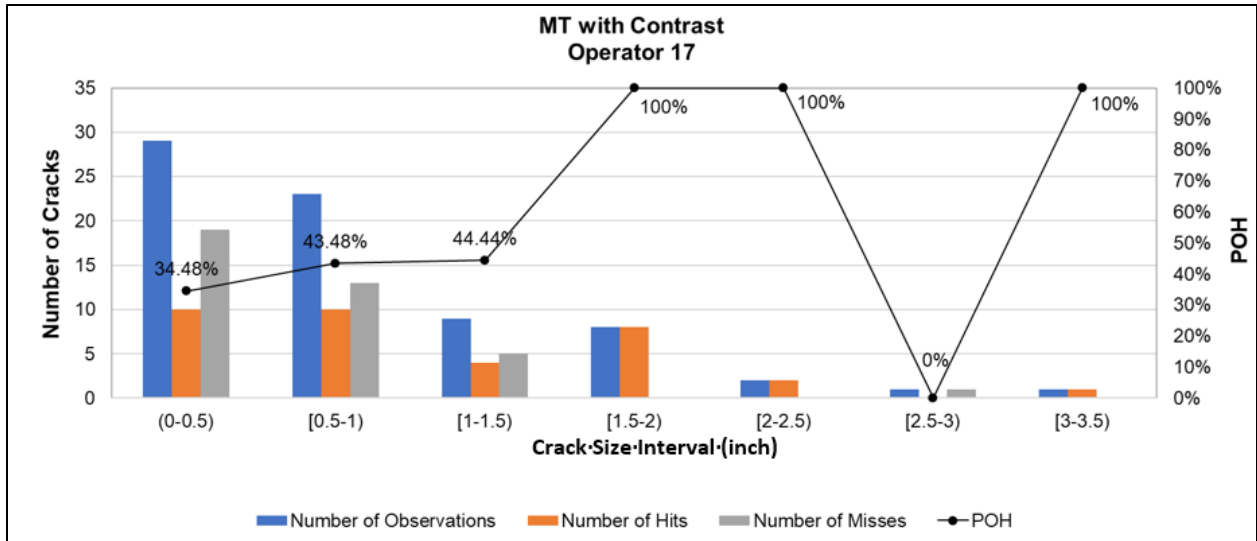


Figure 139. BW MT with Contrast Distribution of Hits – Operator 17

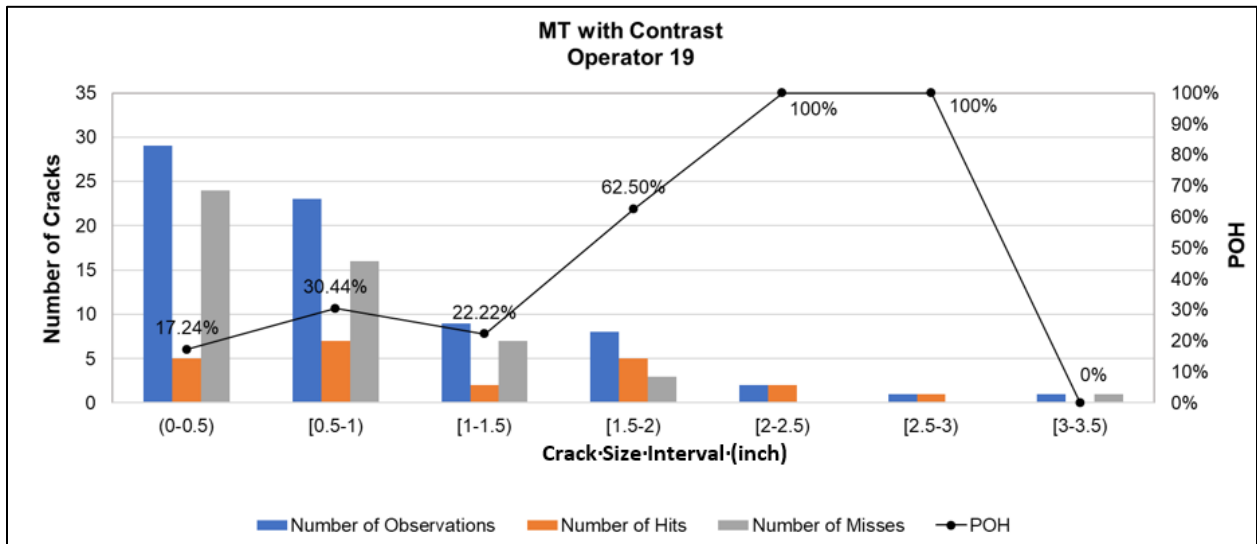


Figure 140. BW MT with Contrast Distribution of Hits – Operator 19

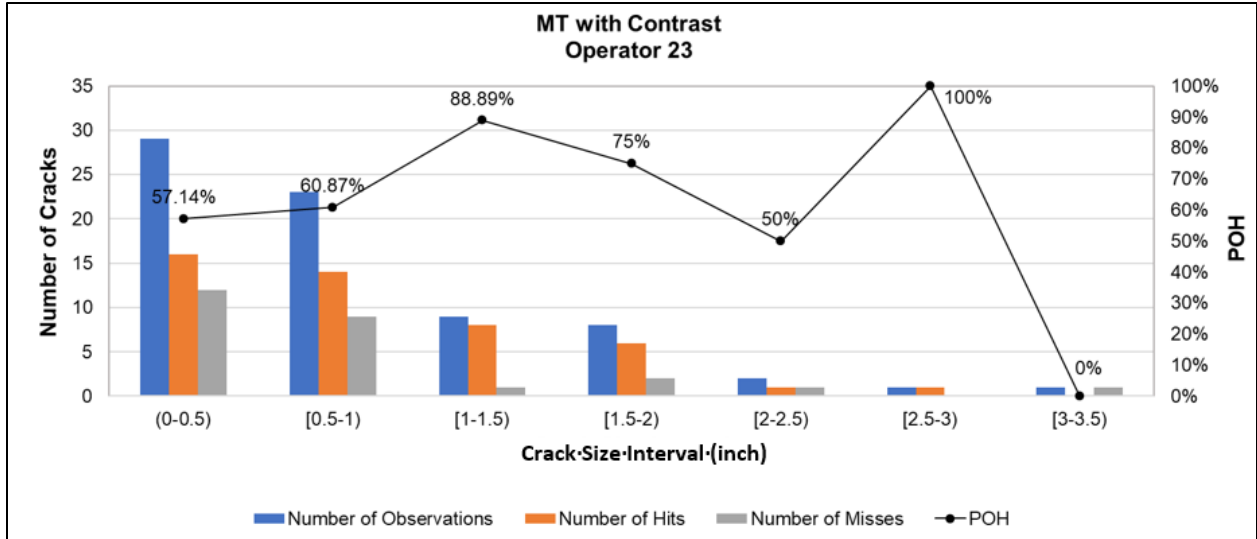


Figure 141. BW MT with Contrast Distribution of Hits – Operator 23

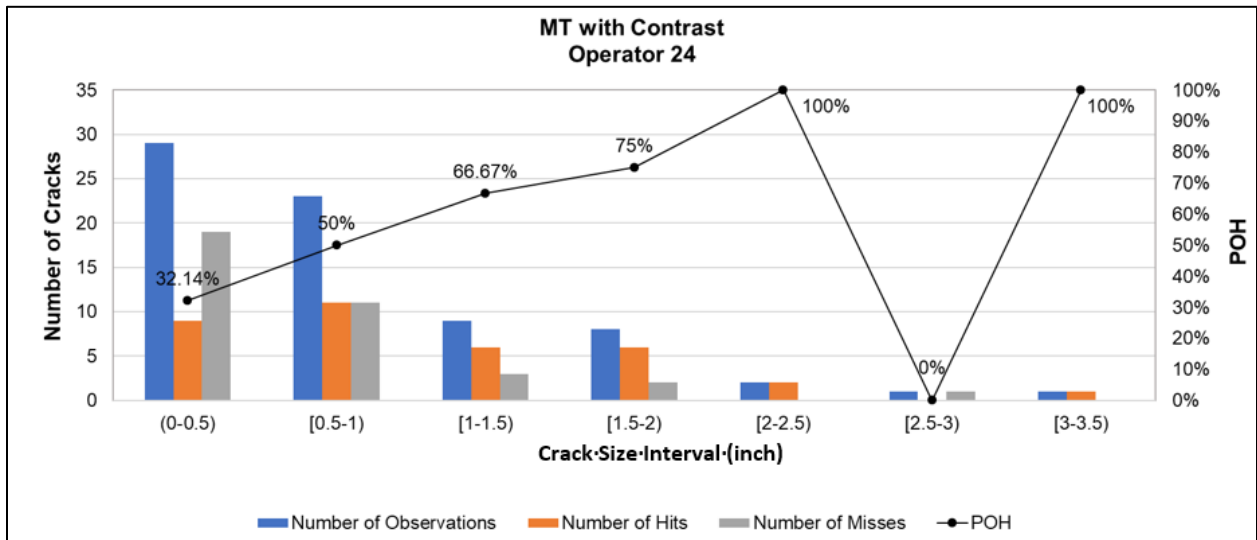


Figure 142. BW MT with Contrast Distribution of Hits – Operator 24

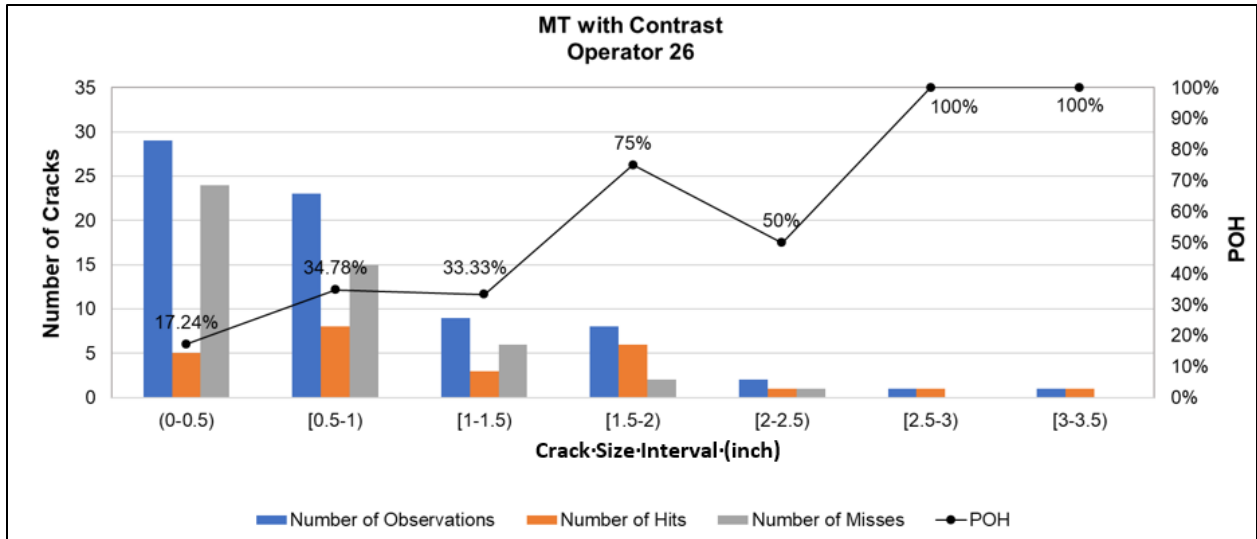


Figure 143. BW MT with Contrast Distribution of Hits – Operator 26

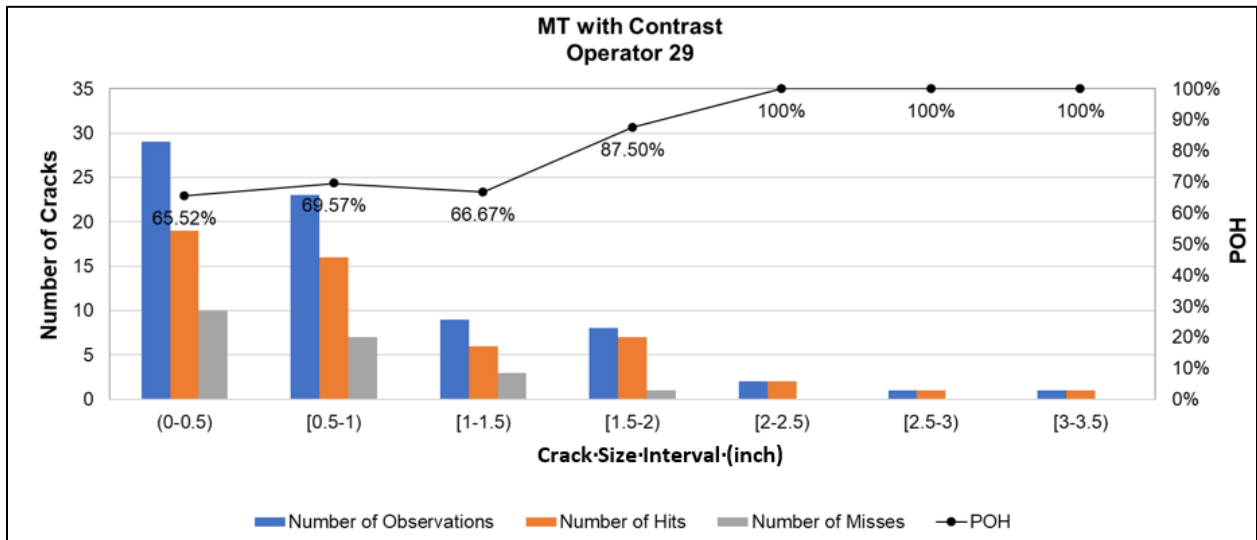


Figure 144. BW MT with Contrast Distribution of Hits – Operator 29

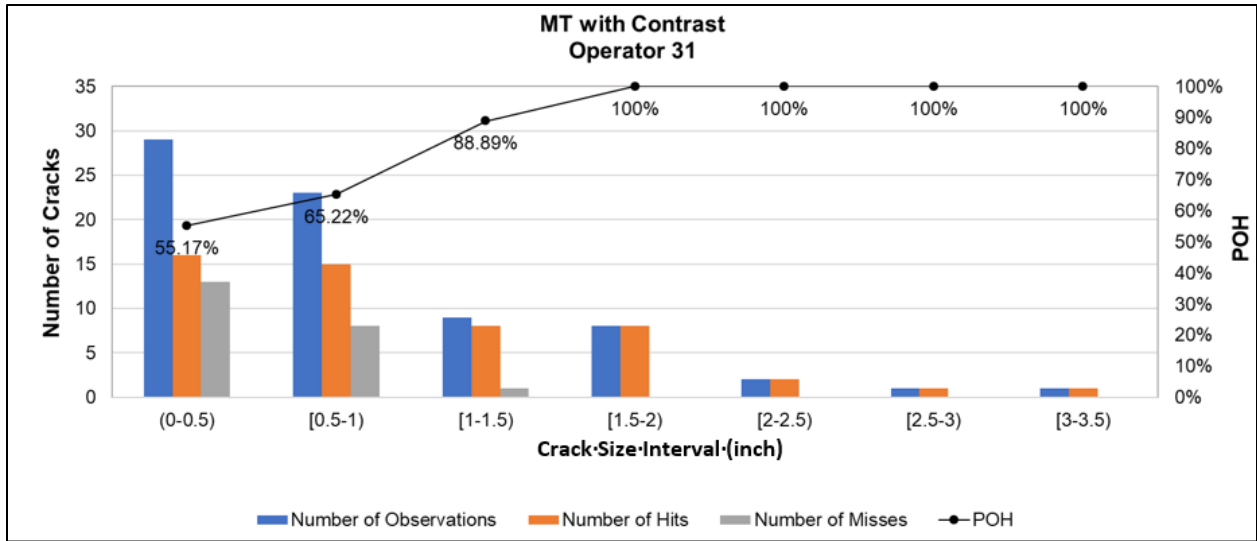


Figure 145. BW MT with Contrast Distribution of Hits – Operator 31

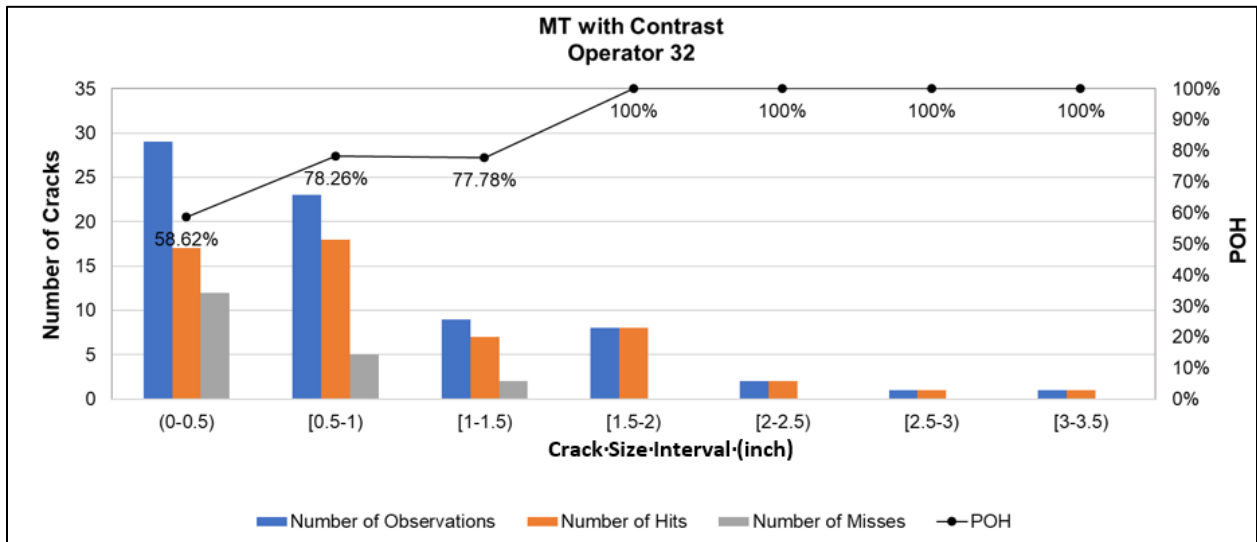


Figure 146. BW MT with Contrast Distribution of Hits – Operator 32

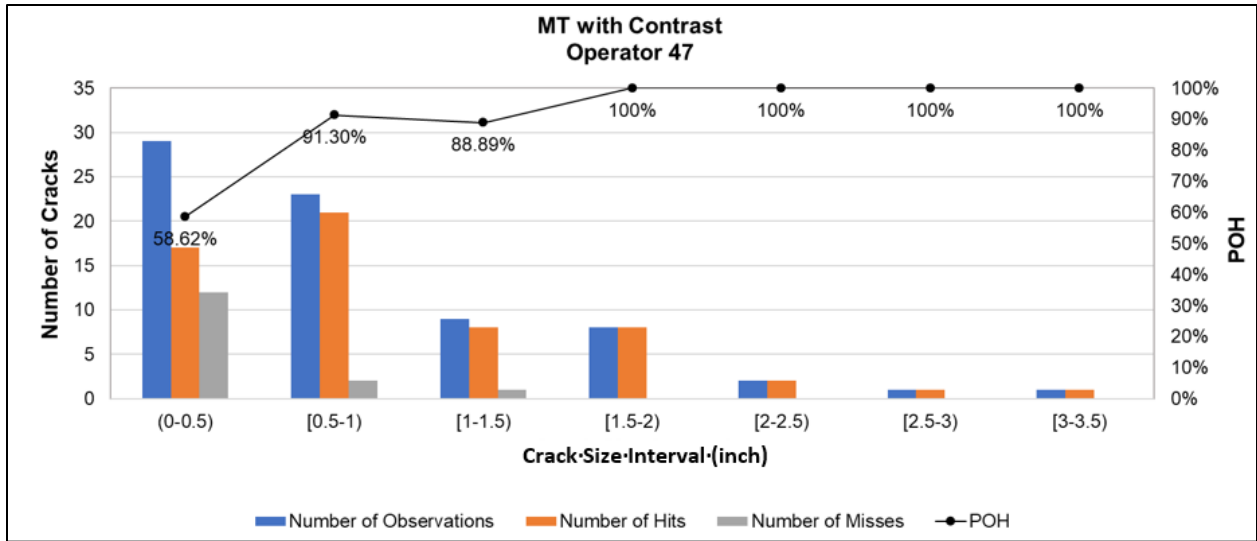


Figure 147. BW MT with Contrast Distribution of Hits – Operator 47

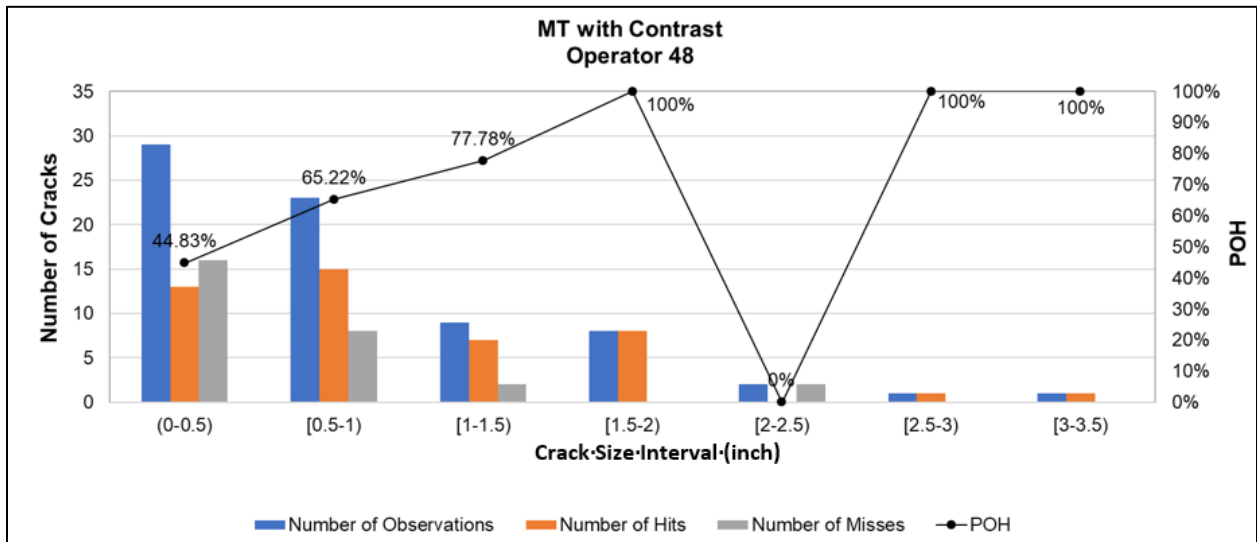


Figure 148. BW MT with Contrast Distribution of Hits – Operator 48

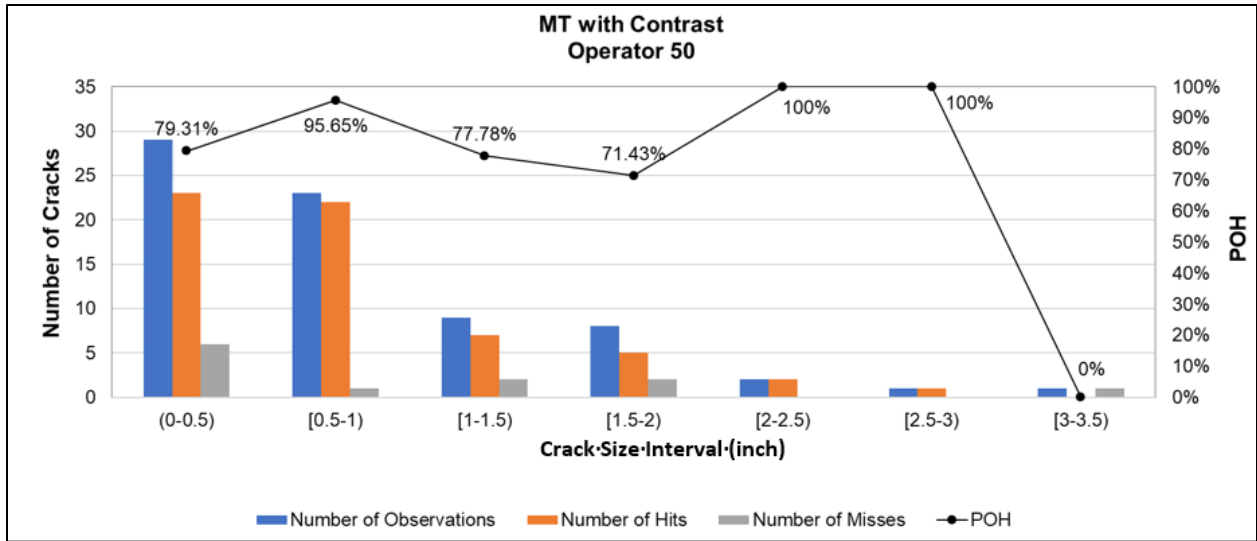


Figure 149. BW MT with Contrast Distribution of Hits – Operator 50

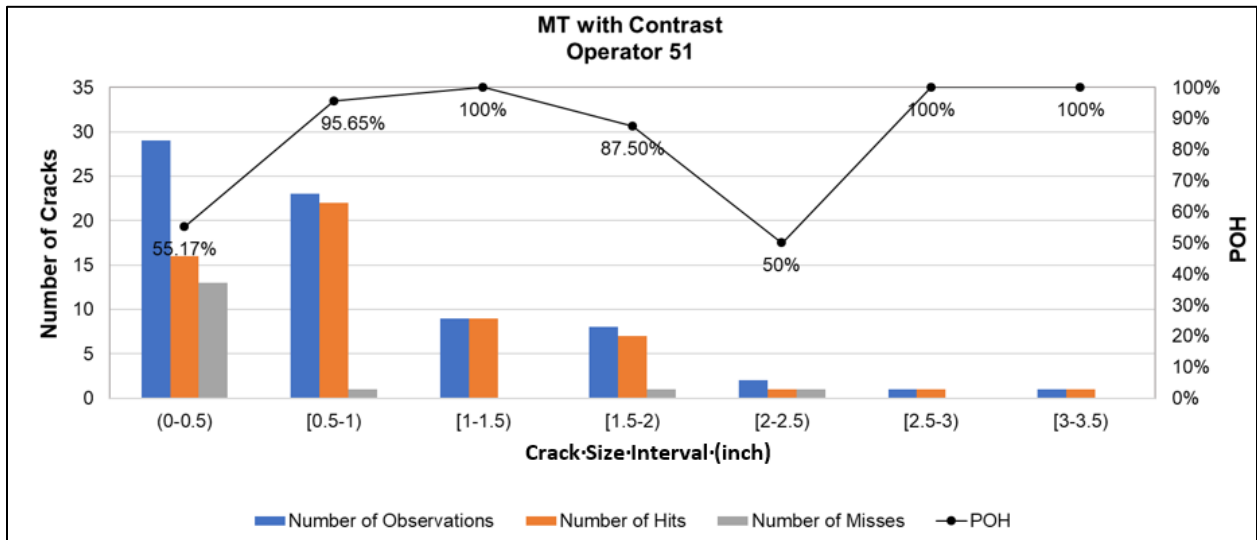


Figure 150. BW MT with Contrast Distribution of Hits – Operator 51

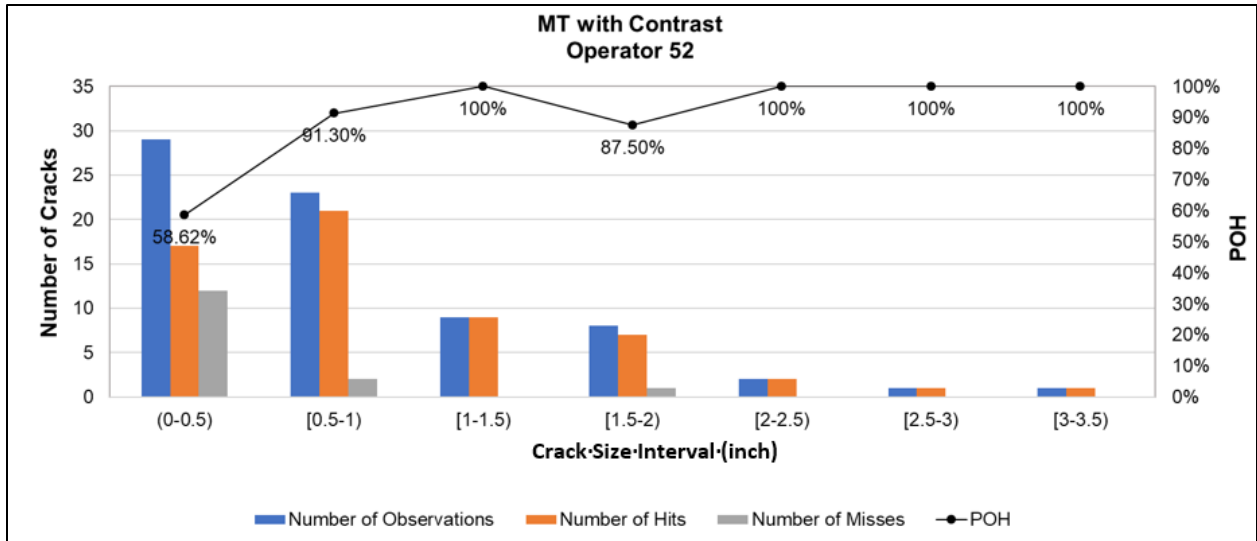


Figure 151. BW MT with Contrast Distribution of Hits – Operator 52

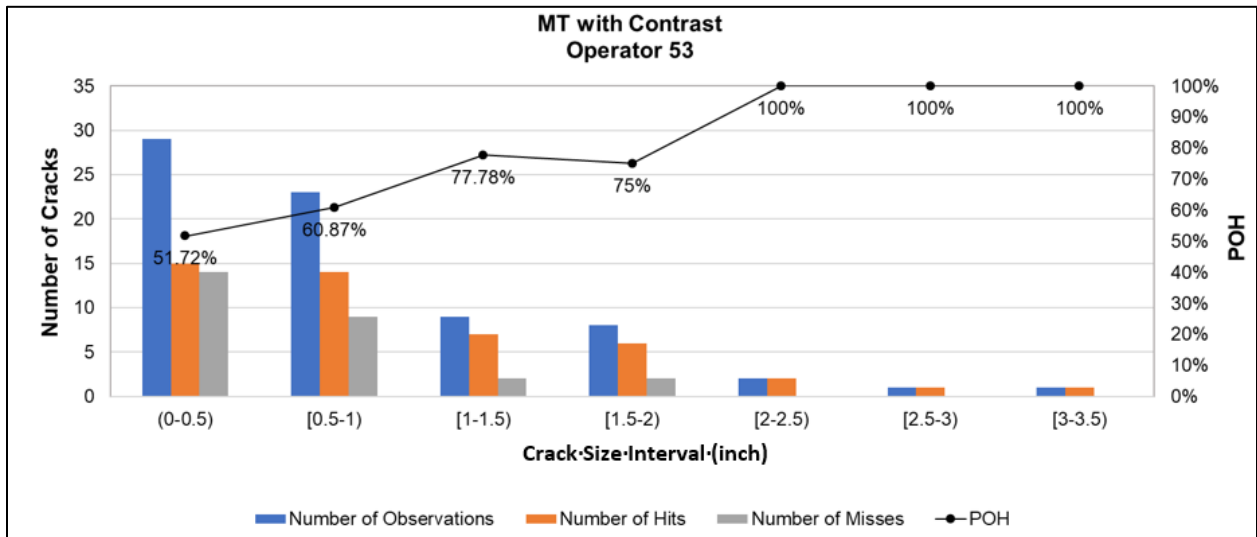


Figure 152. BW MT with Contrast Distribution of Hits – Operator 53

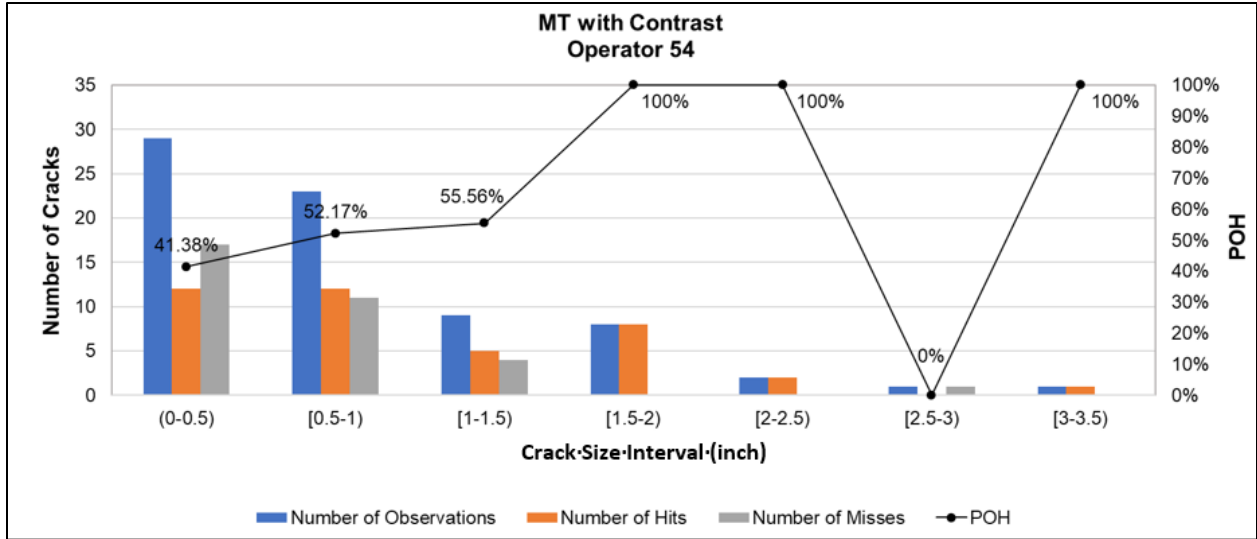


Figure 153. BW MT with Contrast Distribution of Hits – Operator 54

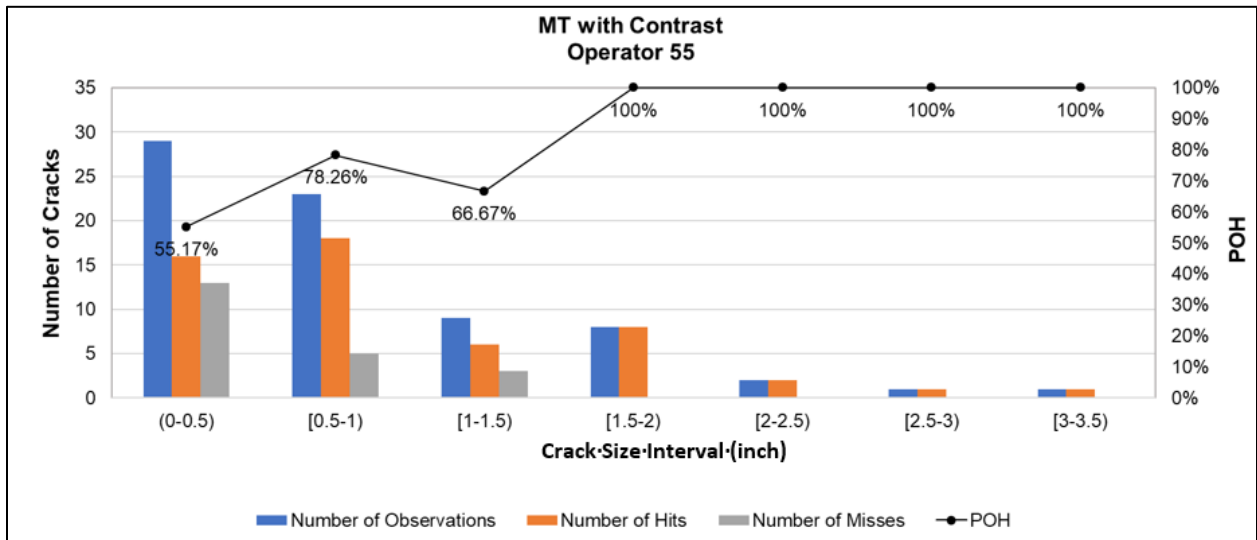


Figure 154. BW MT with Contrast Distribution of Hits – Operator 55

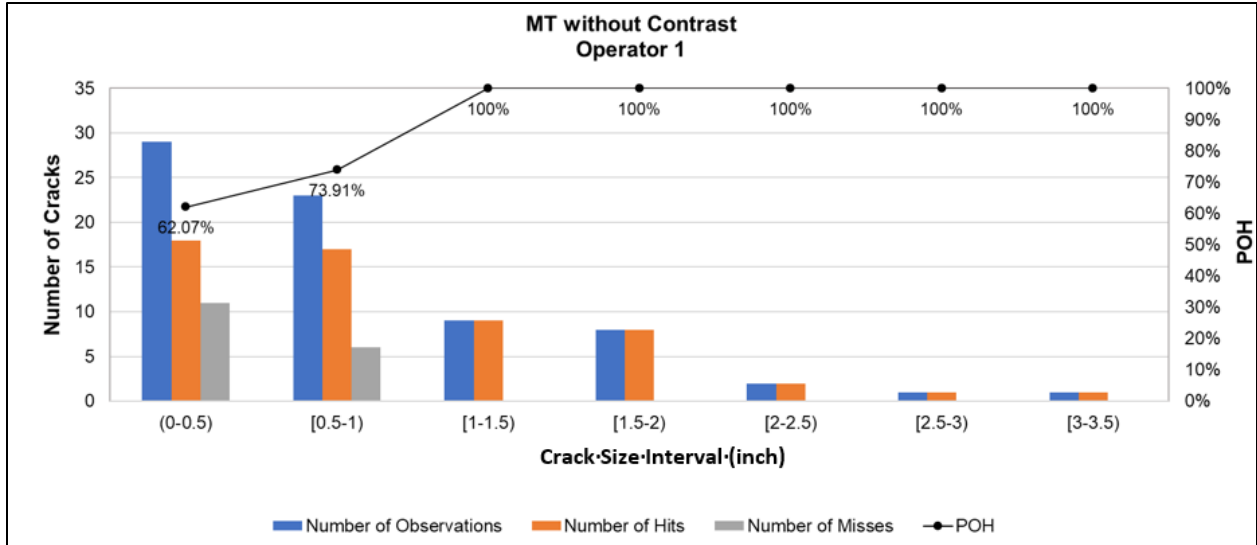


Figure 155. BW MT without Contrast Distribution of Hits – Operator 1

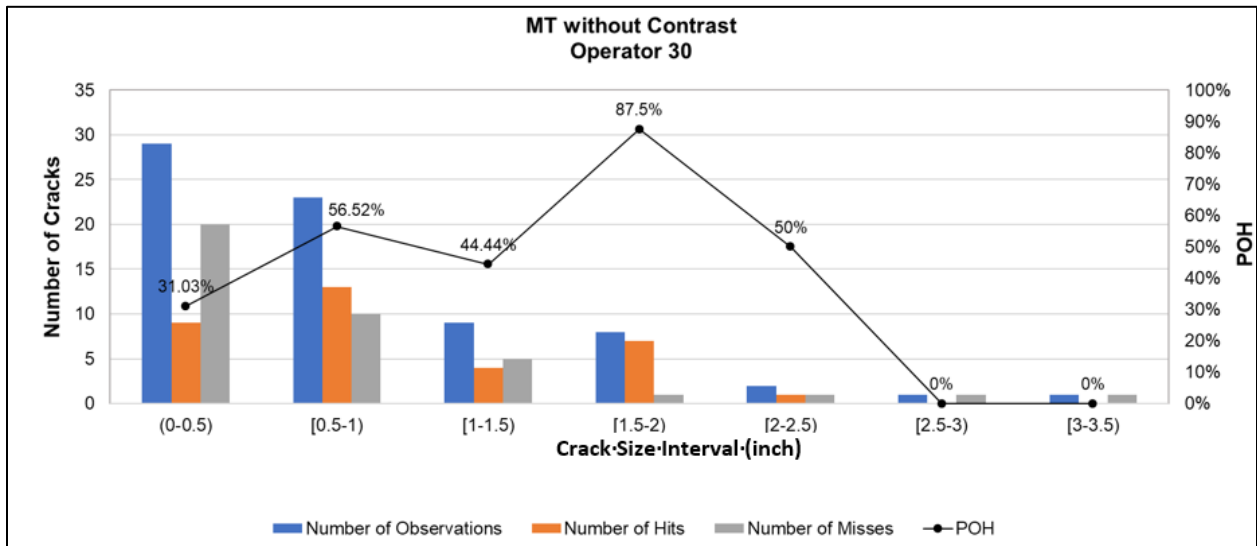


Figure 156. BW MT without Contrast Distribution of Hits – Operator 30

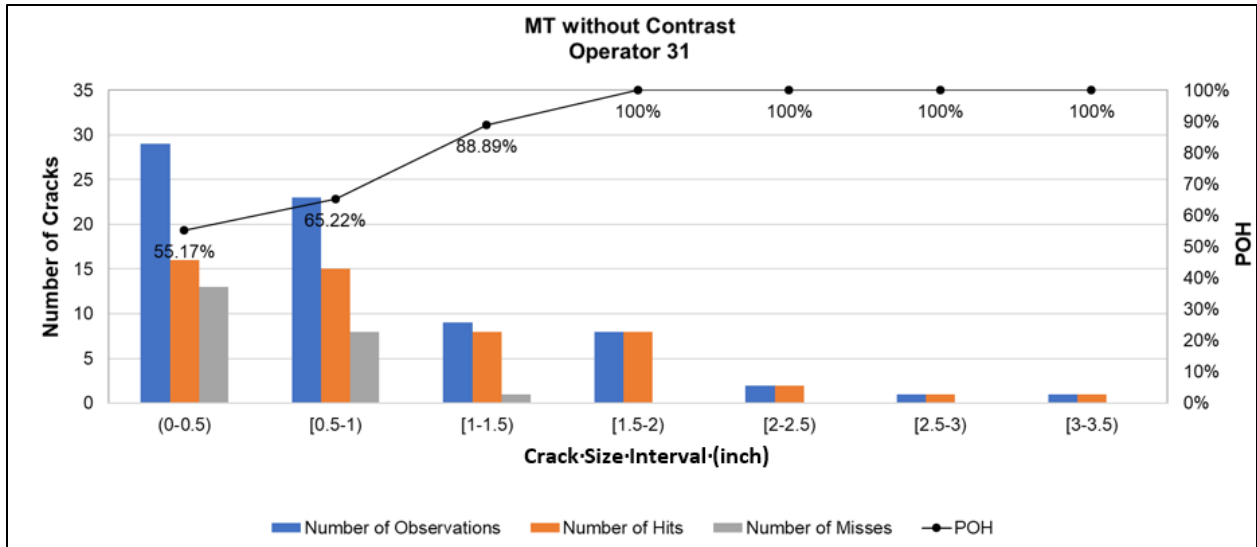


Figure 157. BW MT without Contrast Distribution of Hits – Operator 31

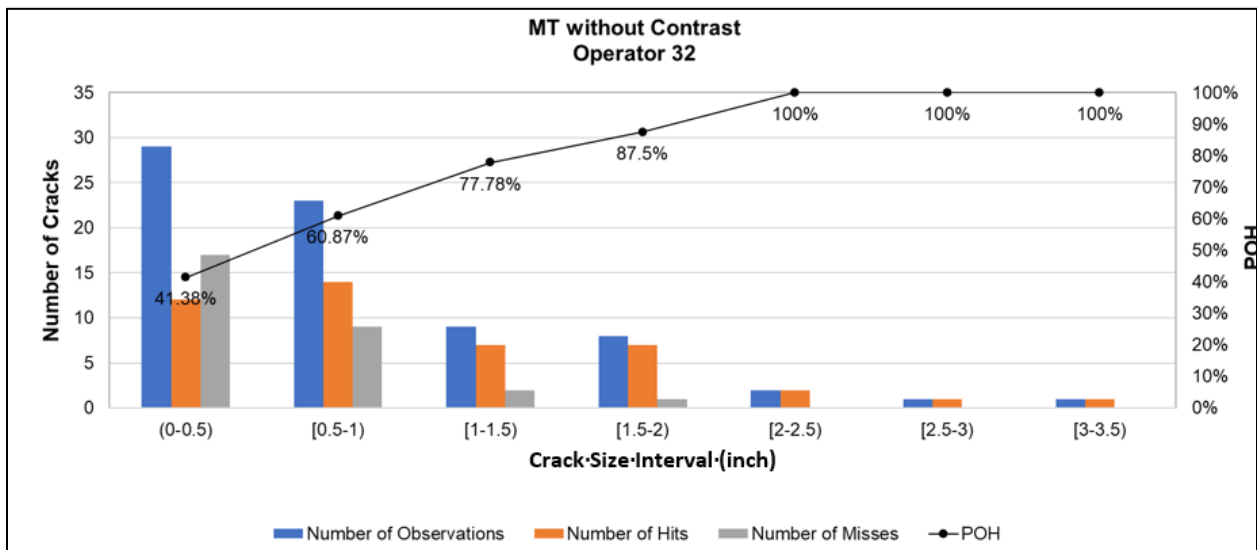


Figure 158. BW MT without Contrast Distribution of Hits – Operator 32

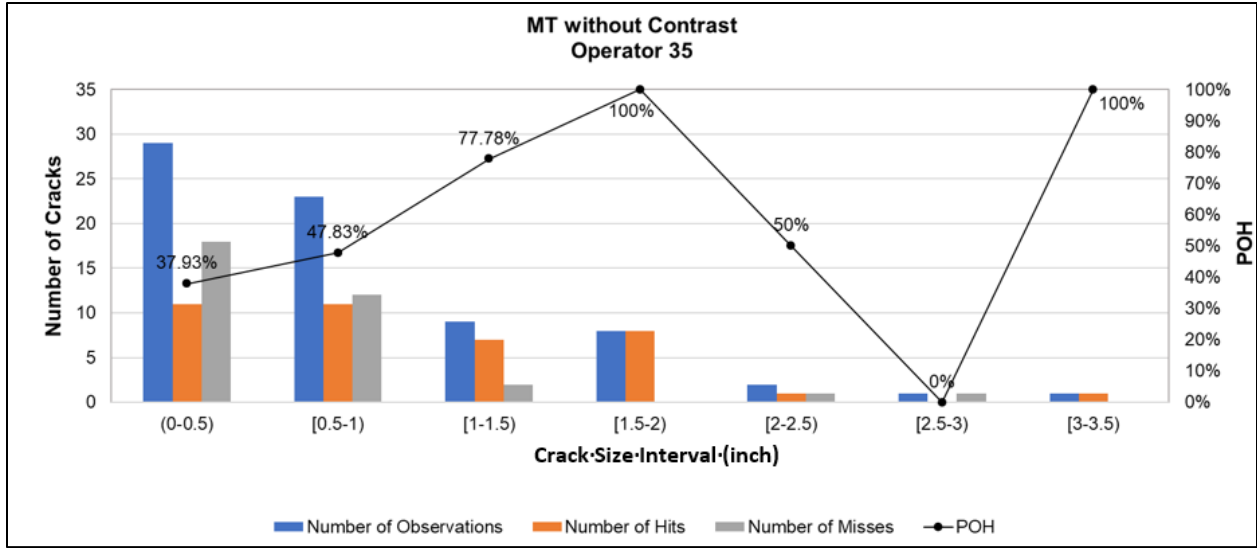


Figure 159. BW MT without Contrast Distribution of Hits – Operator 35

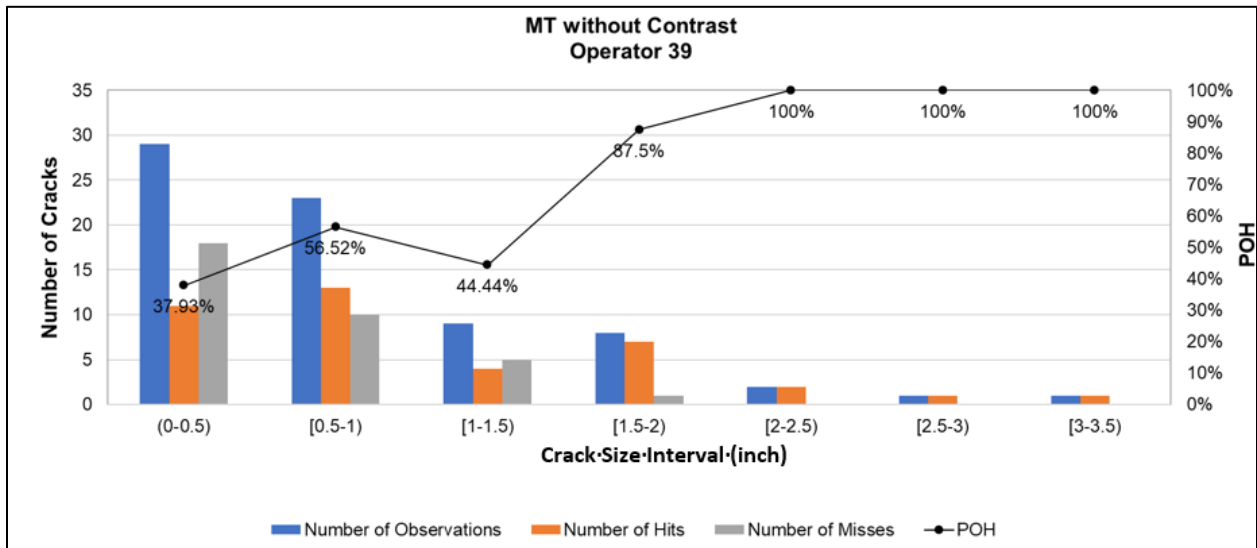


Figure 160. BW MT without Contrast Distribution of Hits – Operator 39

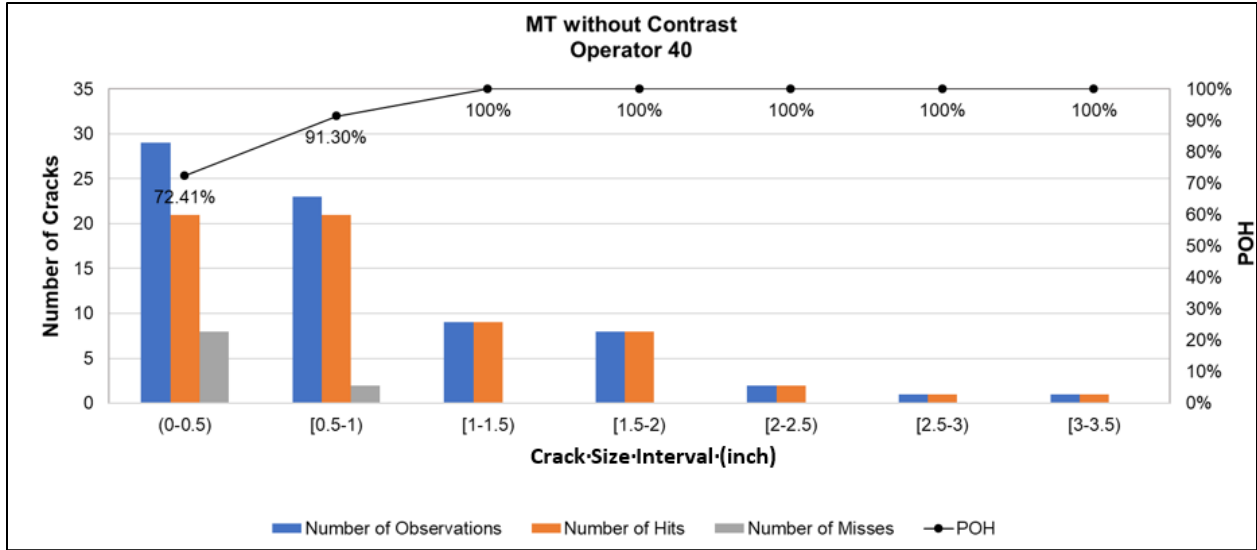


Figure 161. BW MT without Contrast Distribution of Hits – Operator 40

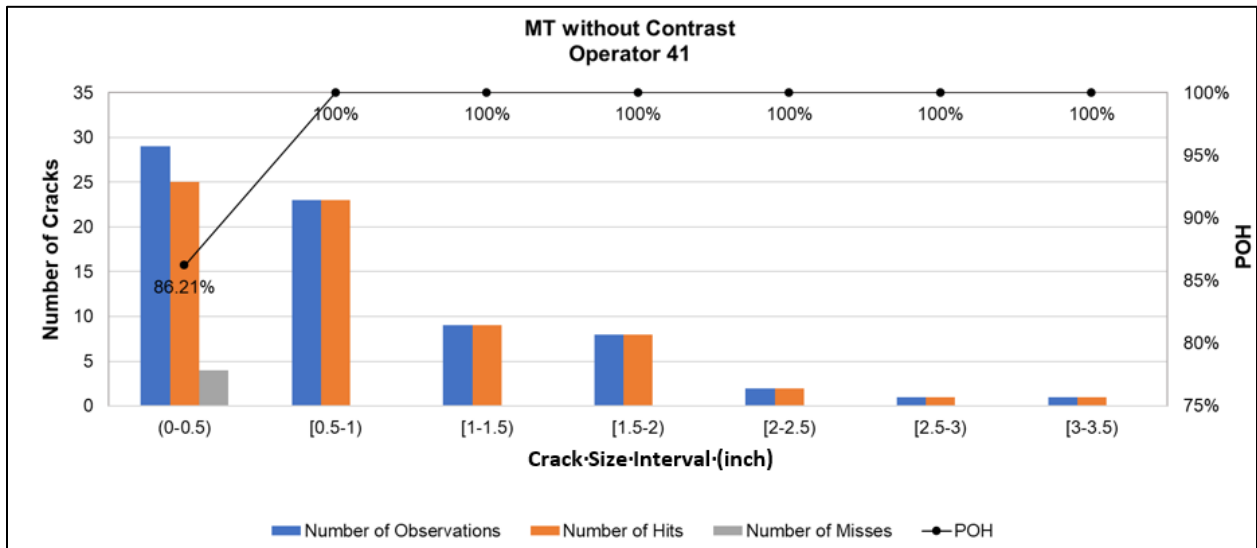


Figure 162. BW MT without Contrast Distribution of Hits – Operator 41

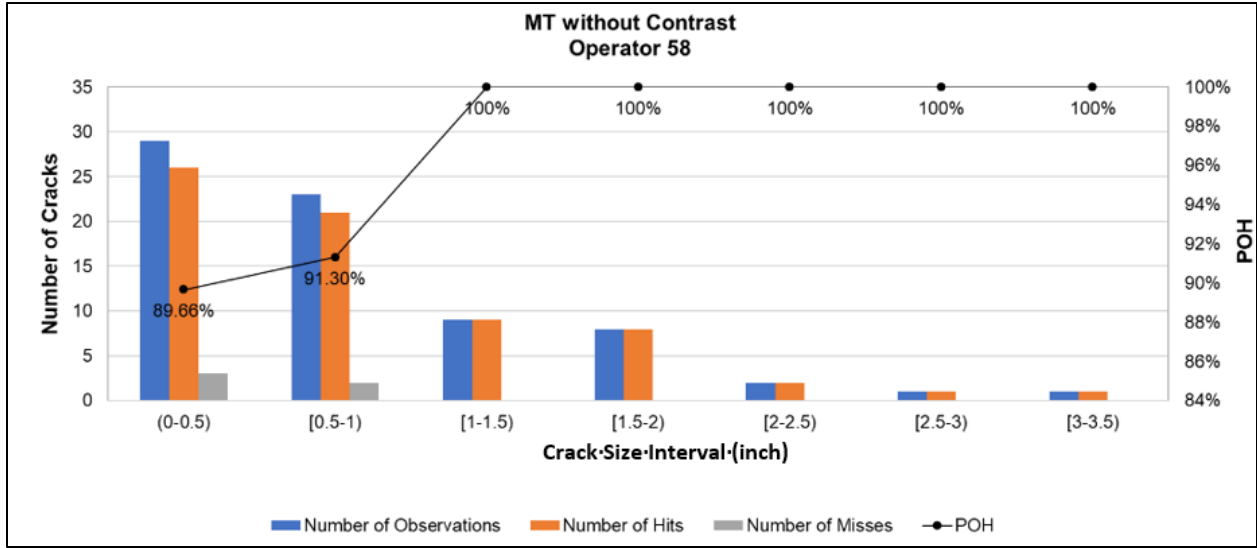


Figure 163. BW MT without Contrast Distribution of Hits – Operator 58

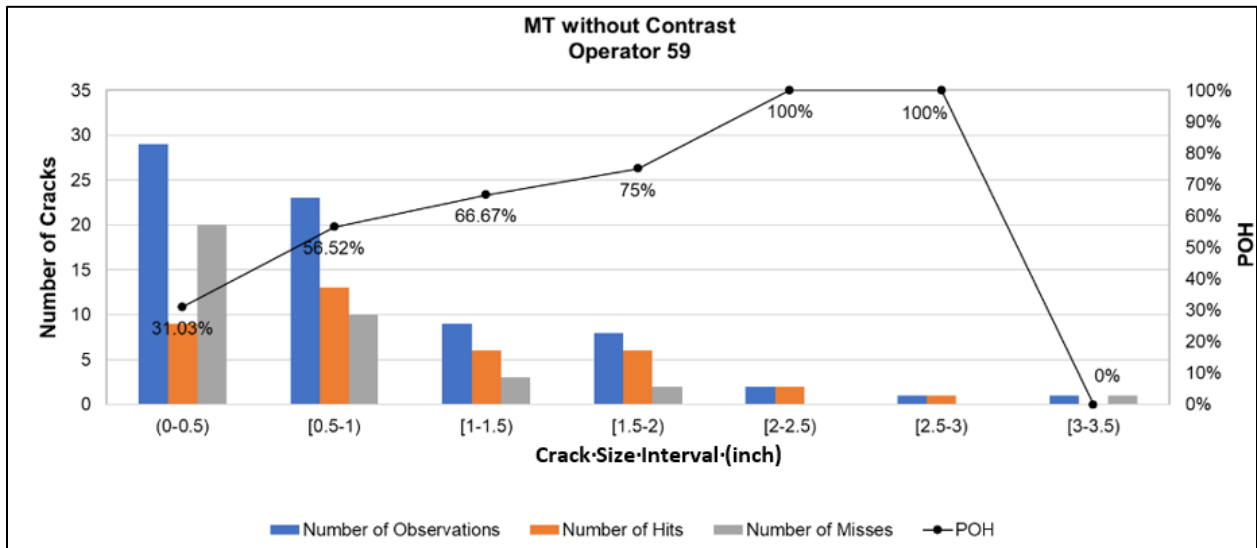


Figure 164. BW MT without Contrast Distribution of Hits – Operator 59

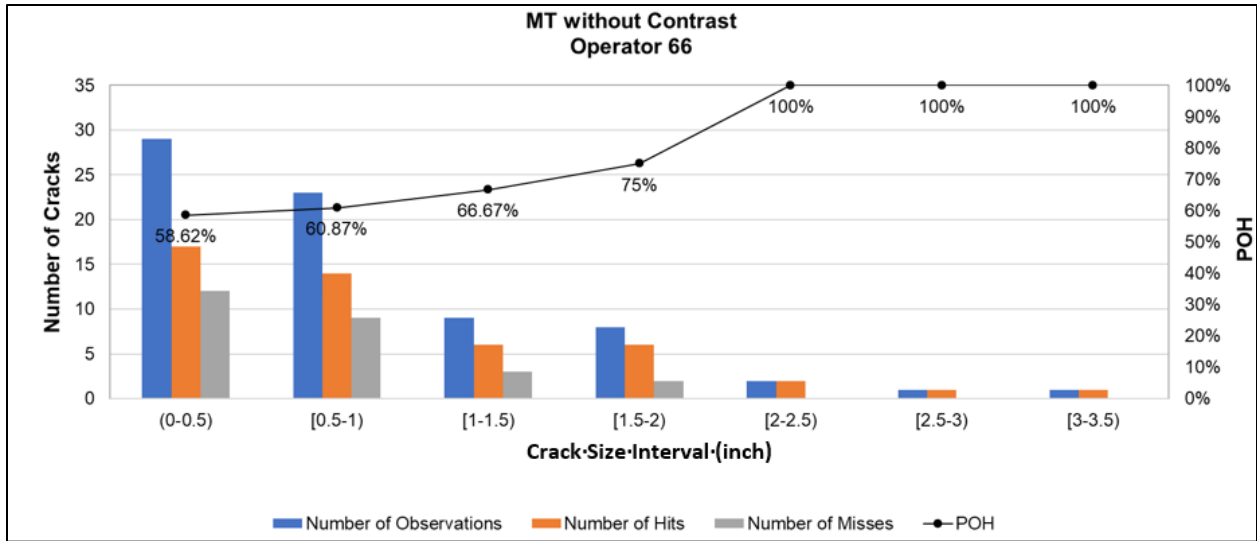


Figure 165. BW MT without Contrast Distribution of Hits – Operator 66

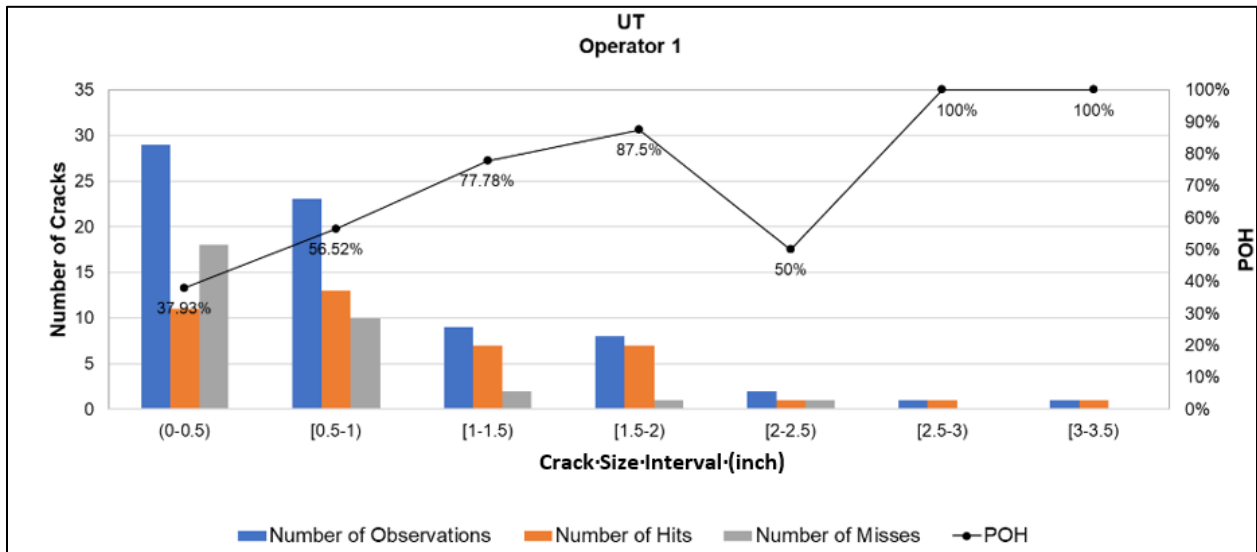


Figure 166. BW UT Distribution of Hits – Operator 1

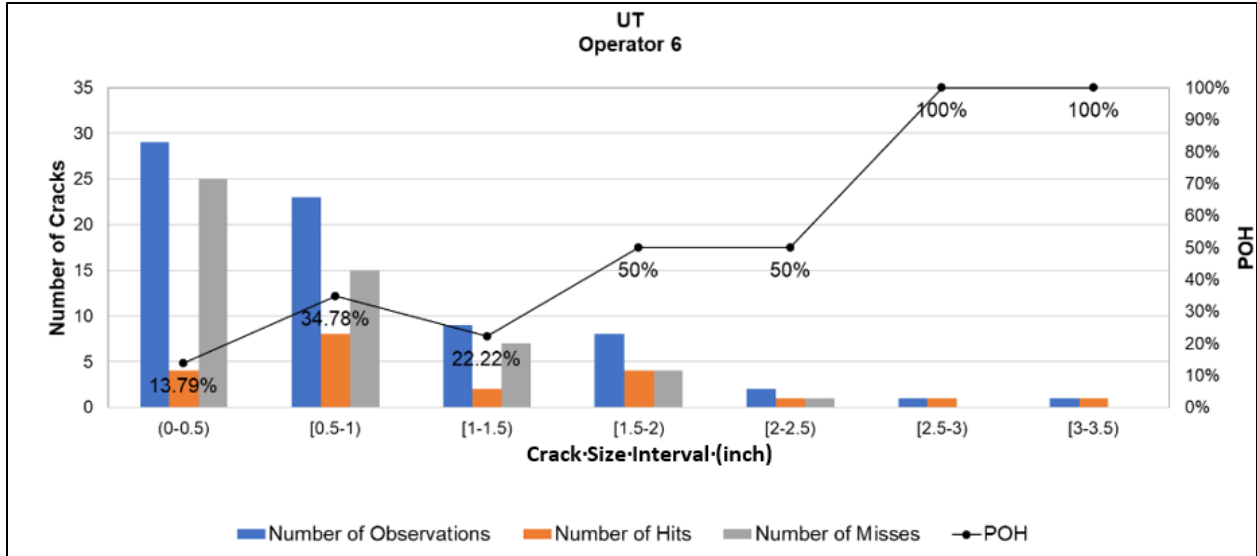


Figure 167. BW UT Distribution of Hits – Operator 6

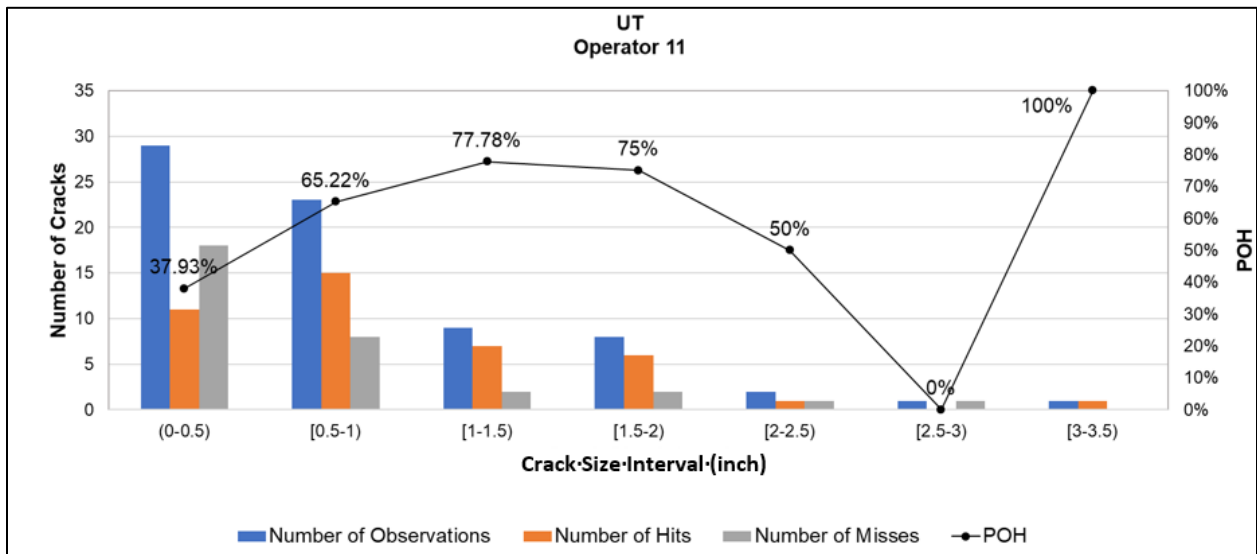


Figure 168. BW UT Distribution of Hits – Operator 11

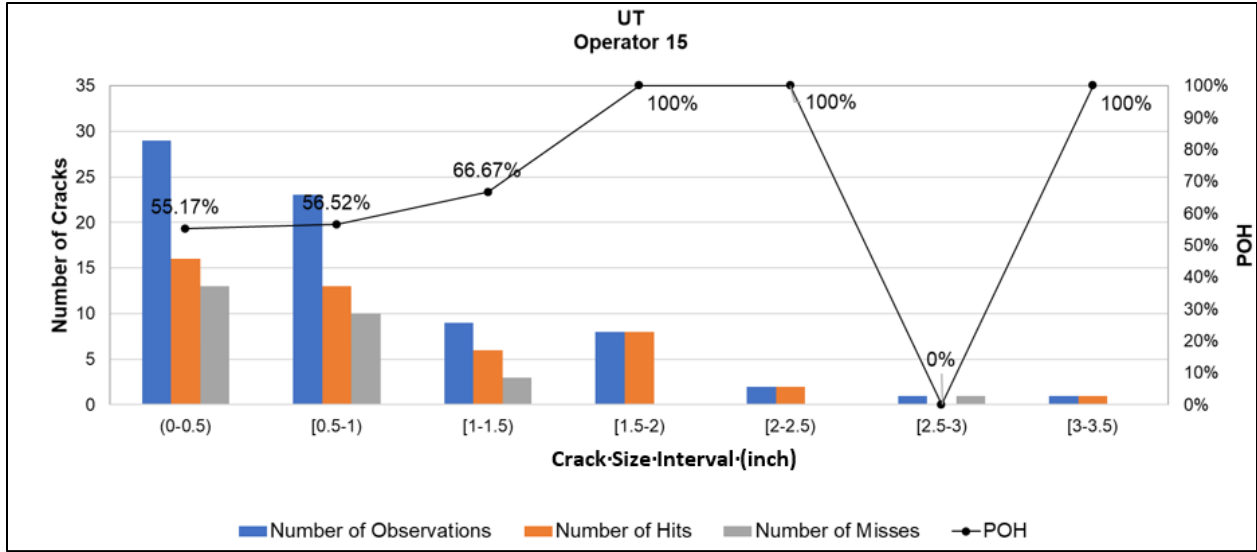


Figure 169. BW UT Distribution of Hits – Operator 15

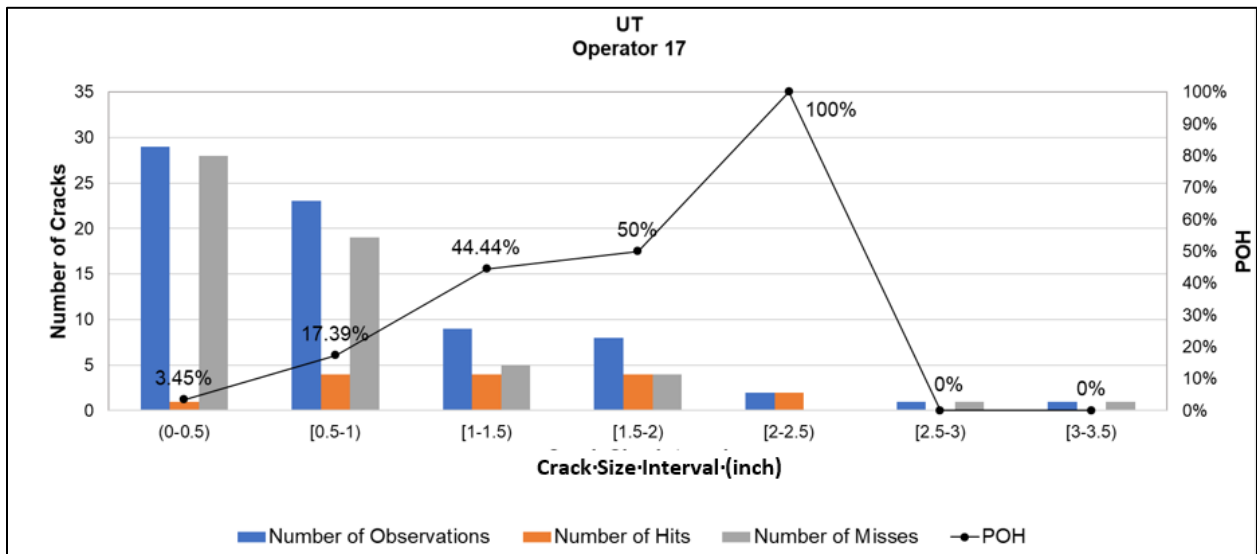


Figure 170. BW UT Distribution of Hits – Operator 17

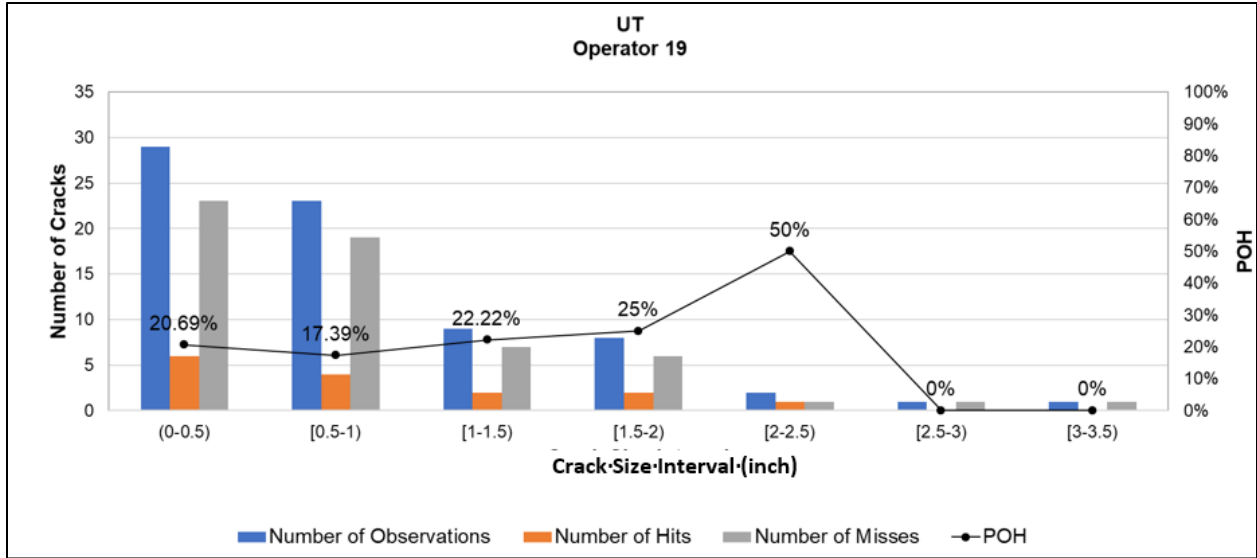


Figure 171. BW UT Distribution of Hits – Operator 19

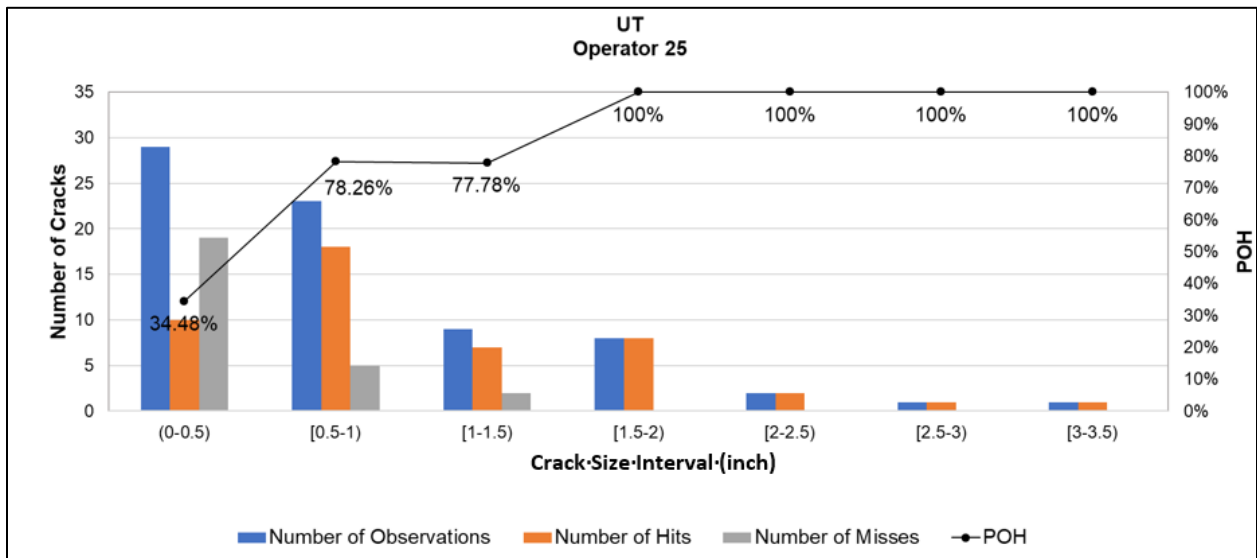


Figure 172. BW UT Distribution of Hits – Operator 25

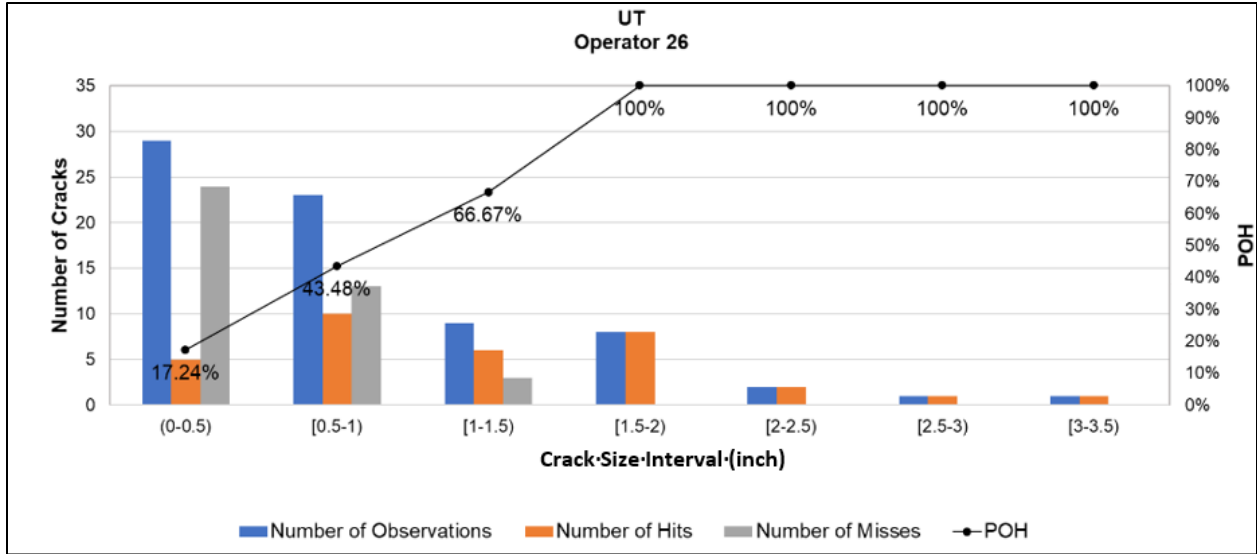


Figure 173. BW UT Distribution of Hits – Operator 26

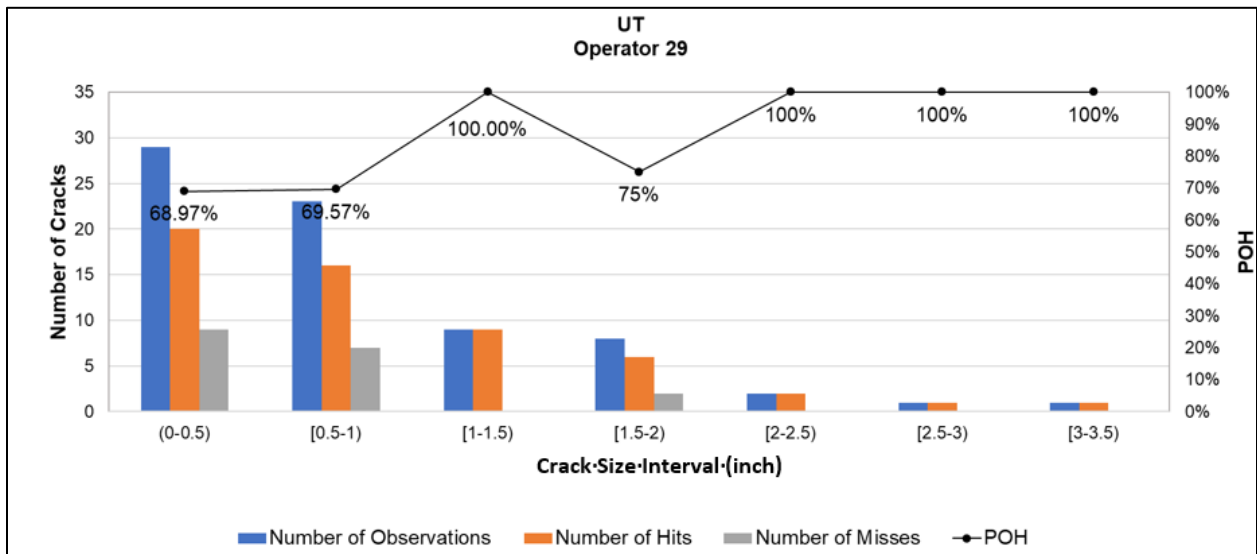


Figure 174. BW UT Distribution of Hits – Operator 29

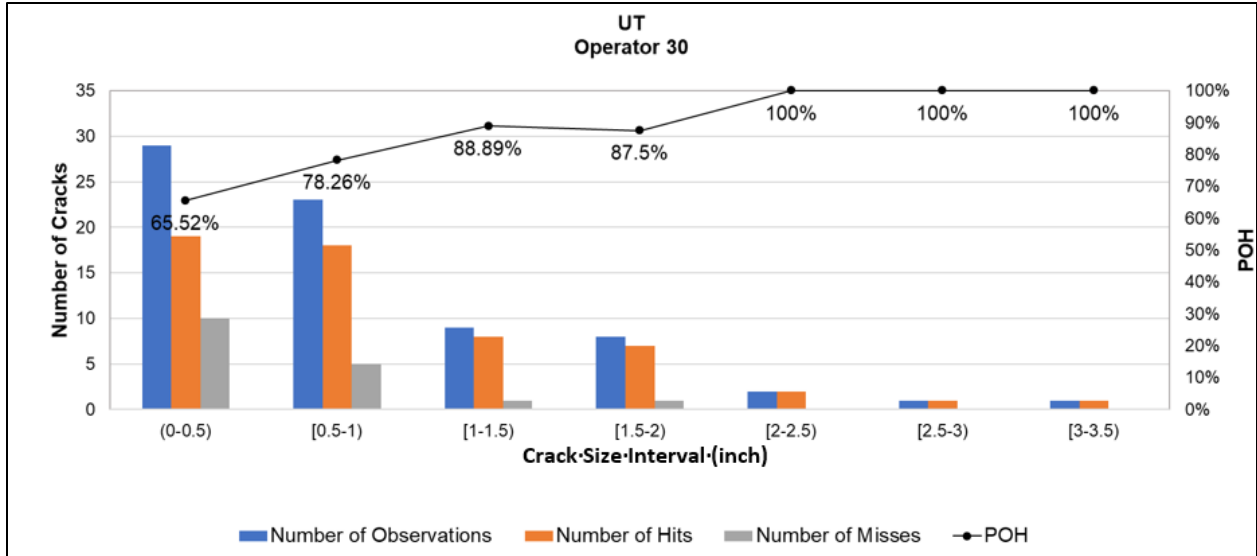


Figure 175. BW UT Distribution of Hits – Operator 30

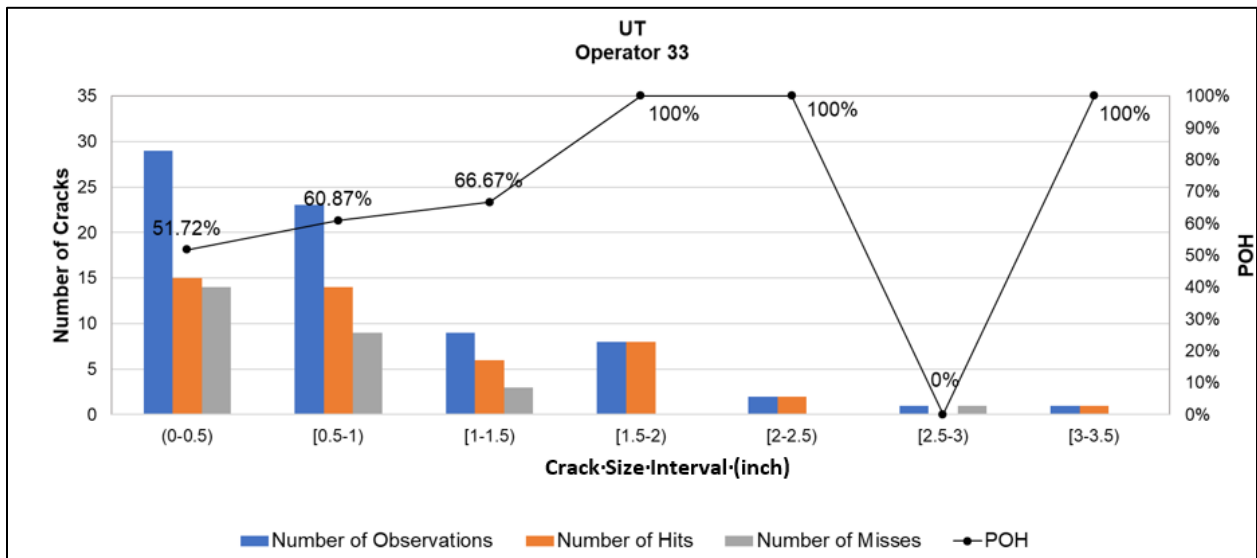


Figure 176. BW UT Distribution of Hits – Operator 33

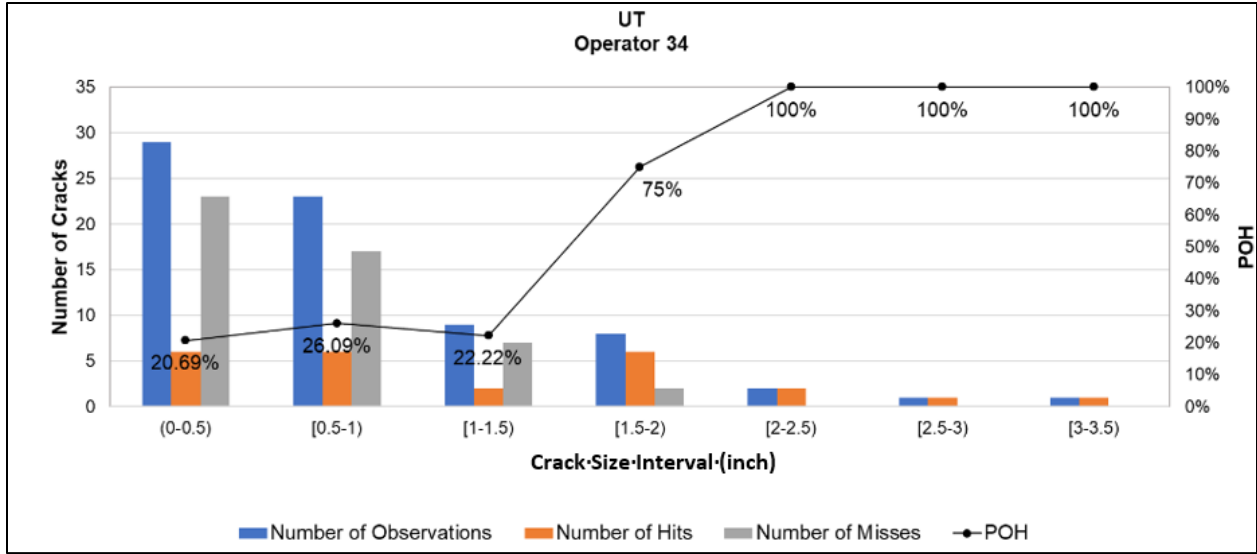


Figure 177. BW UT Distribution of Hits – Operator 34

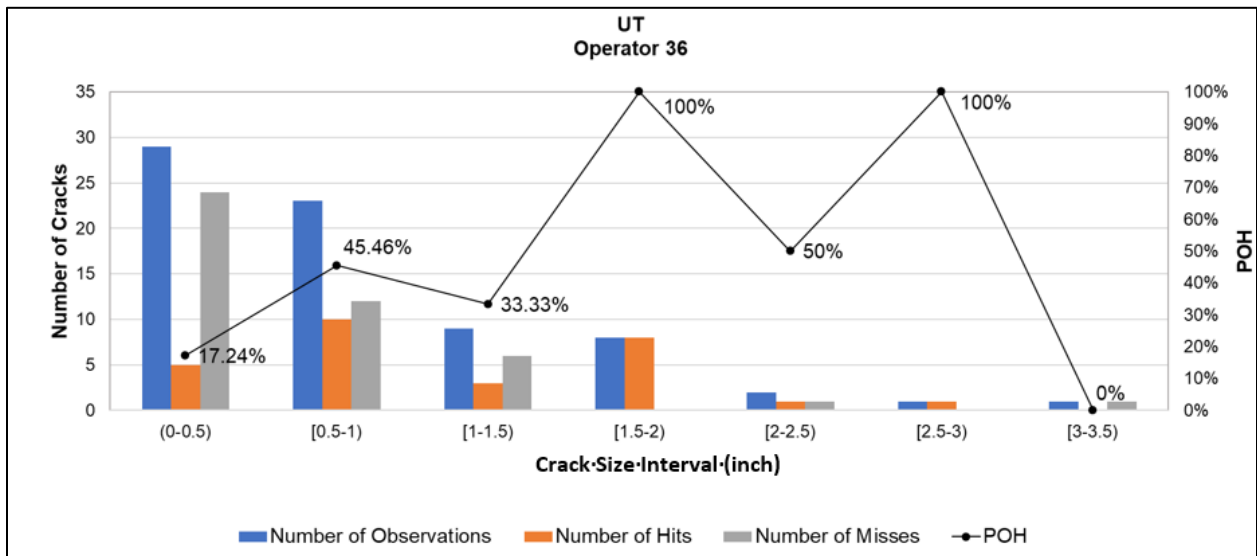


Figure 178. BW UT Distribution of Hits – Operator 36

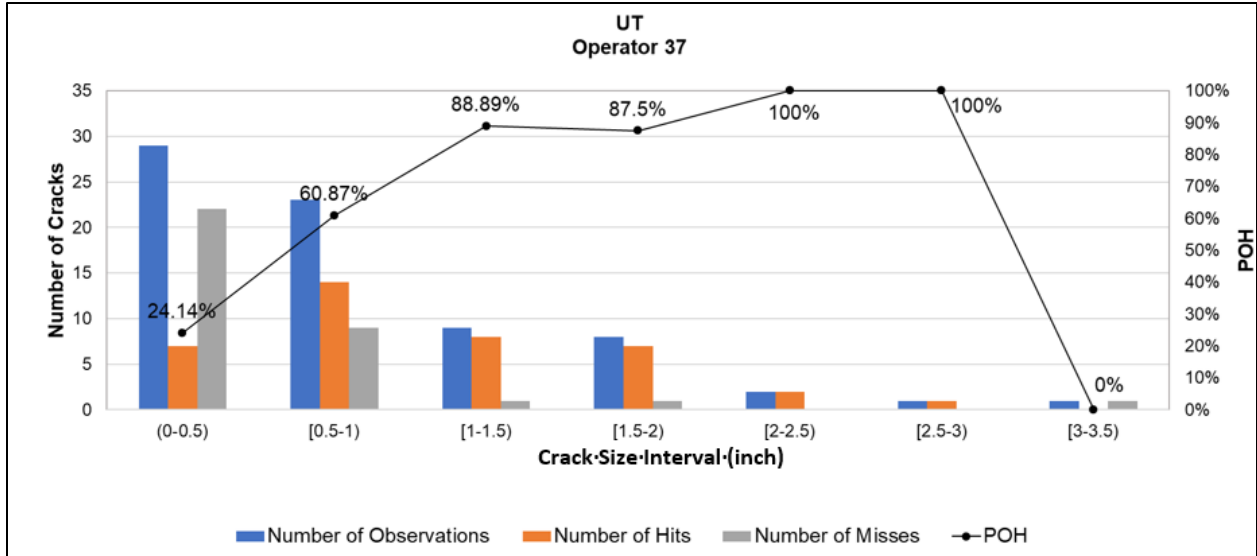


Figure 179. BW UT Distribution of Hits – Operator 37

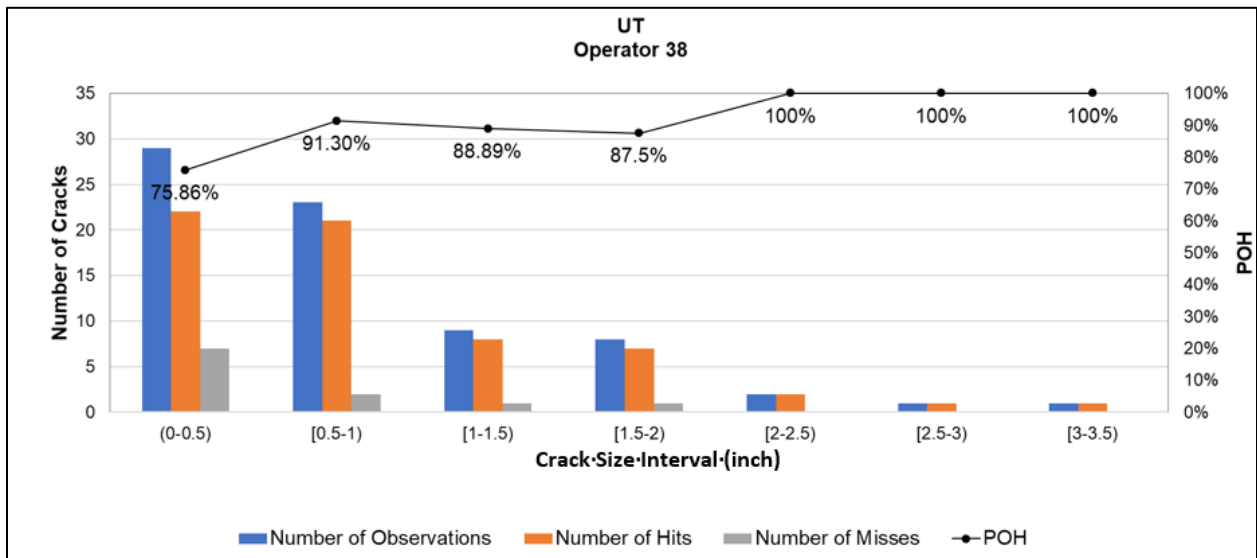


Figure 180. BW UT Distribution of Hits – Operator 38

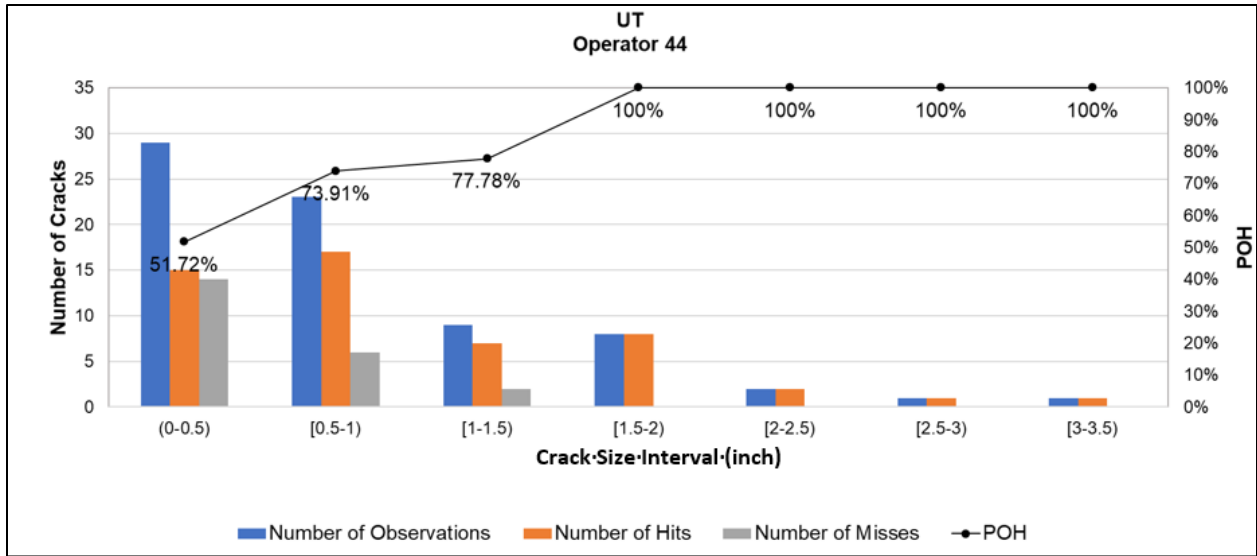


Figure 181. BW UT Distribution of Hits – Operator 44

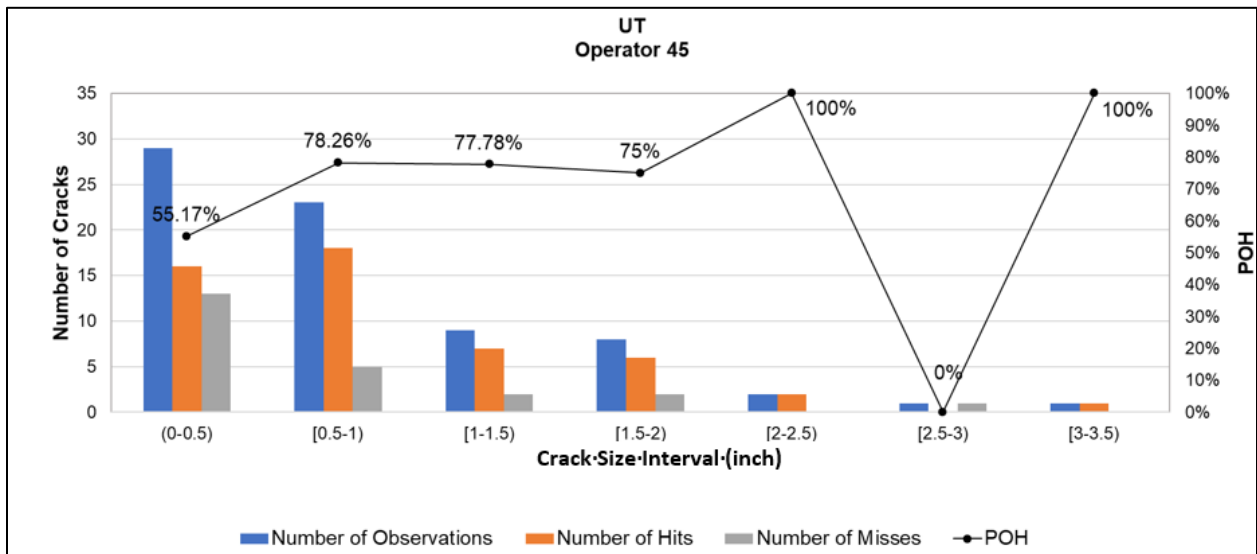


Figure 182. BW UT Distribution of Hits – Operator 45

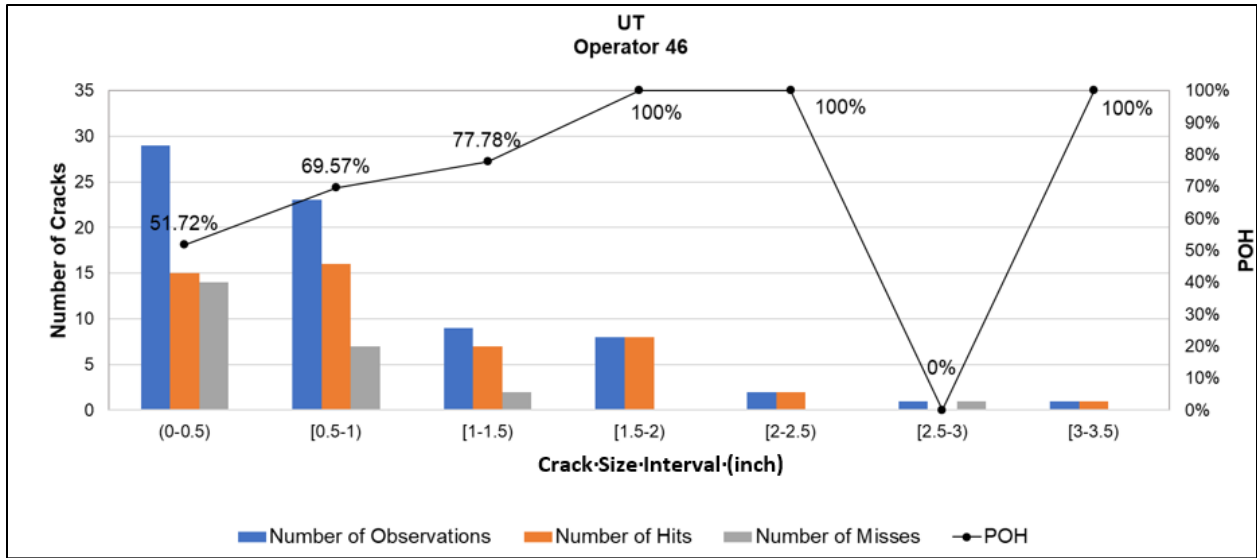


Figure 183. BW UT Distribution of Hits – Operator 46

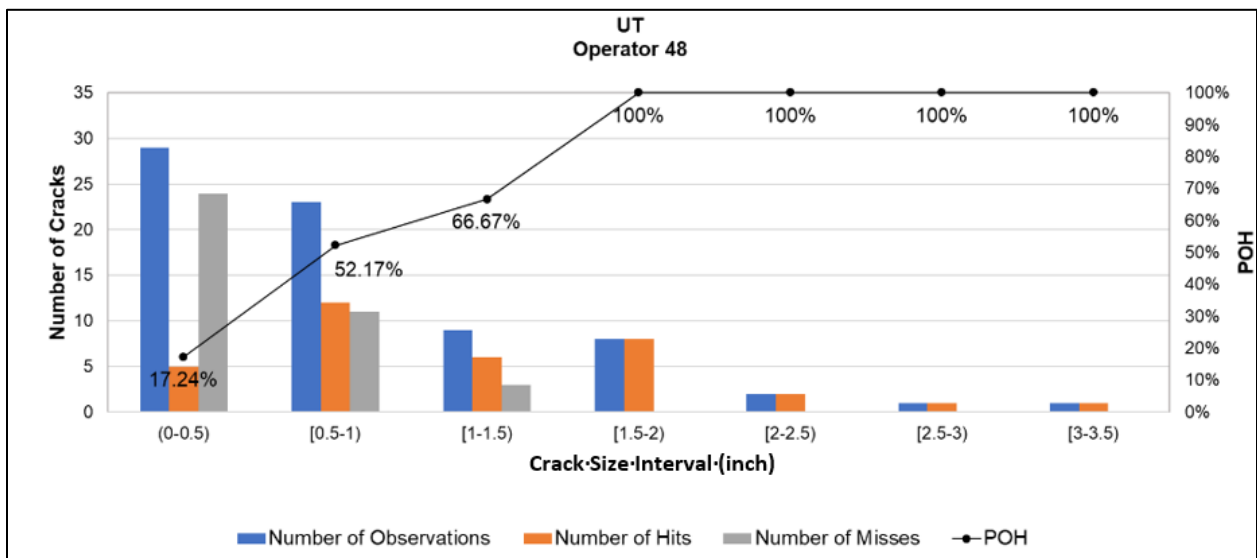


Figure 184. BW UT Distribution of Hits – Operator 48

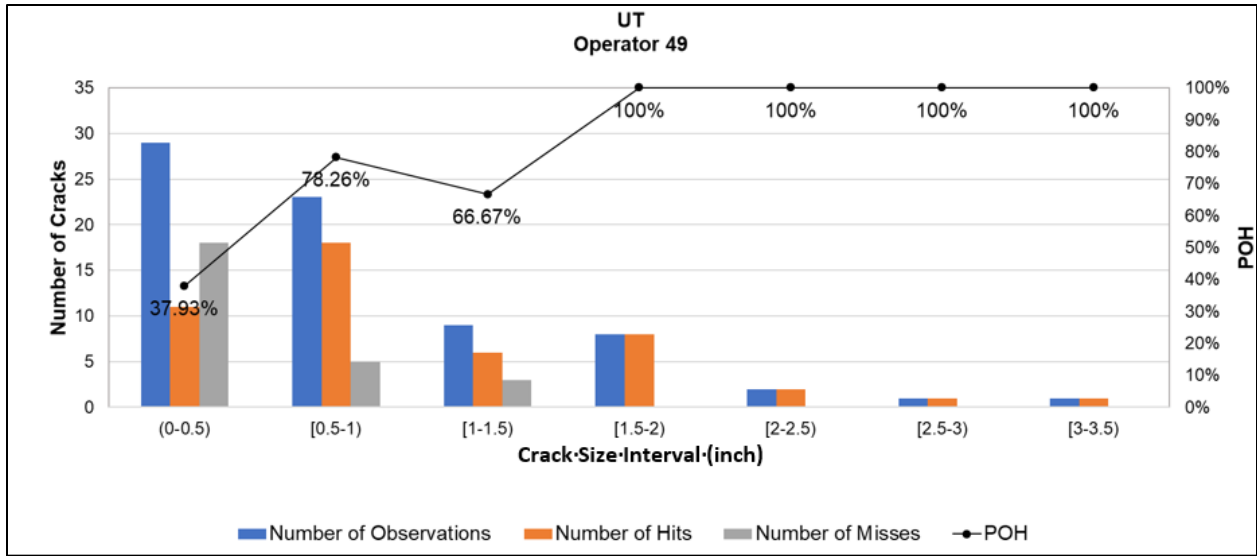


Figure 185. BW UT Distribution of Hits – Operator 49

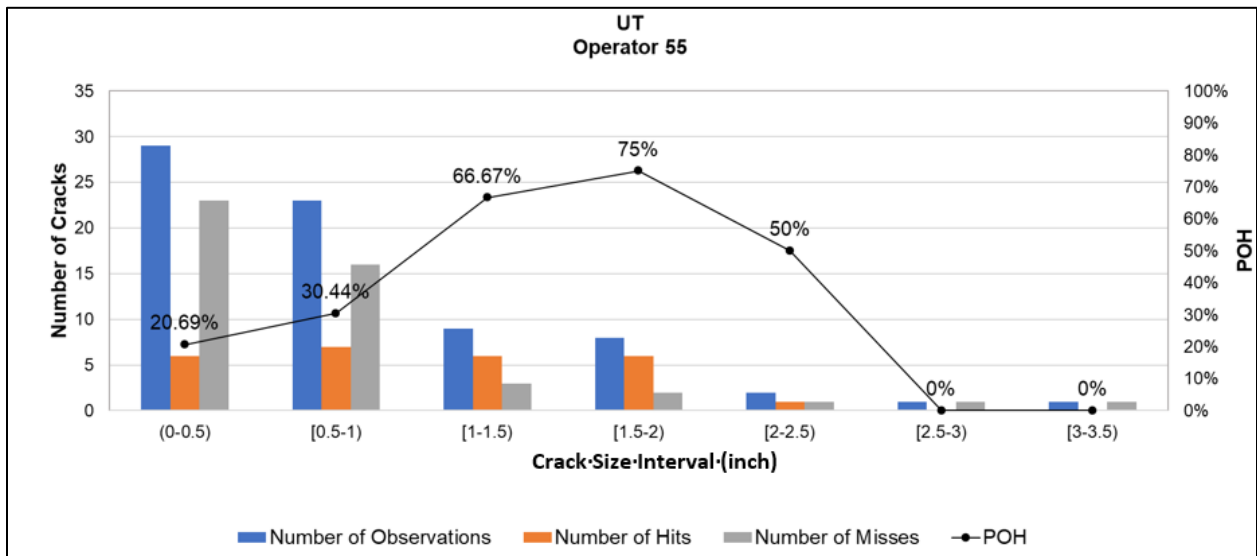


Figure 186. BW UT Distribution of Hits – Operator 55

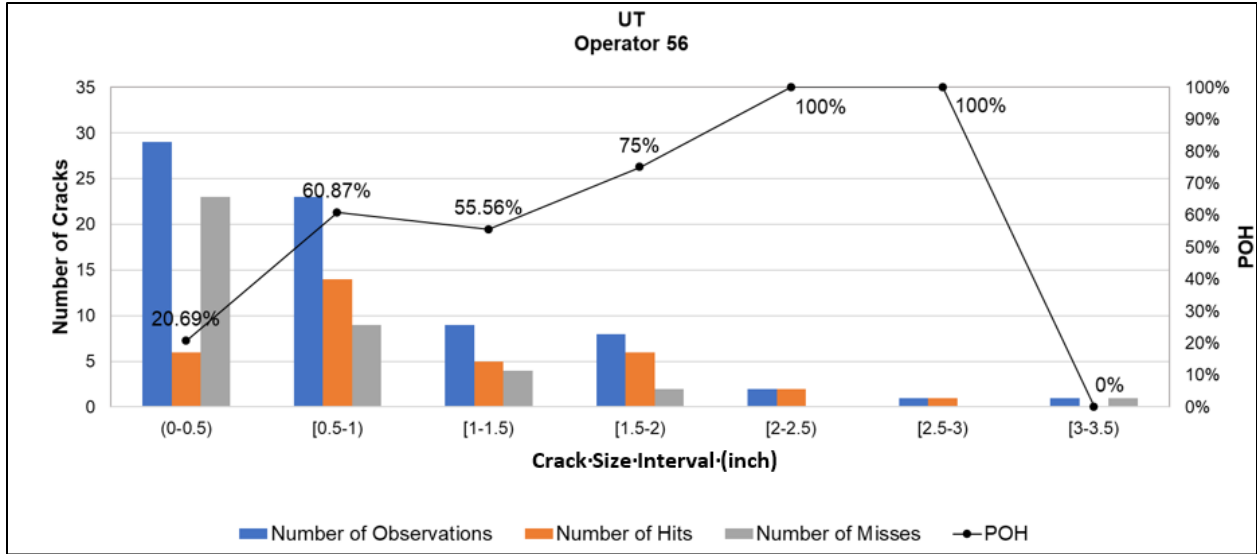


Figure 187. BW UT Distribution of Hits – Operator 56

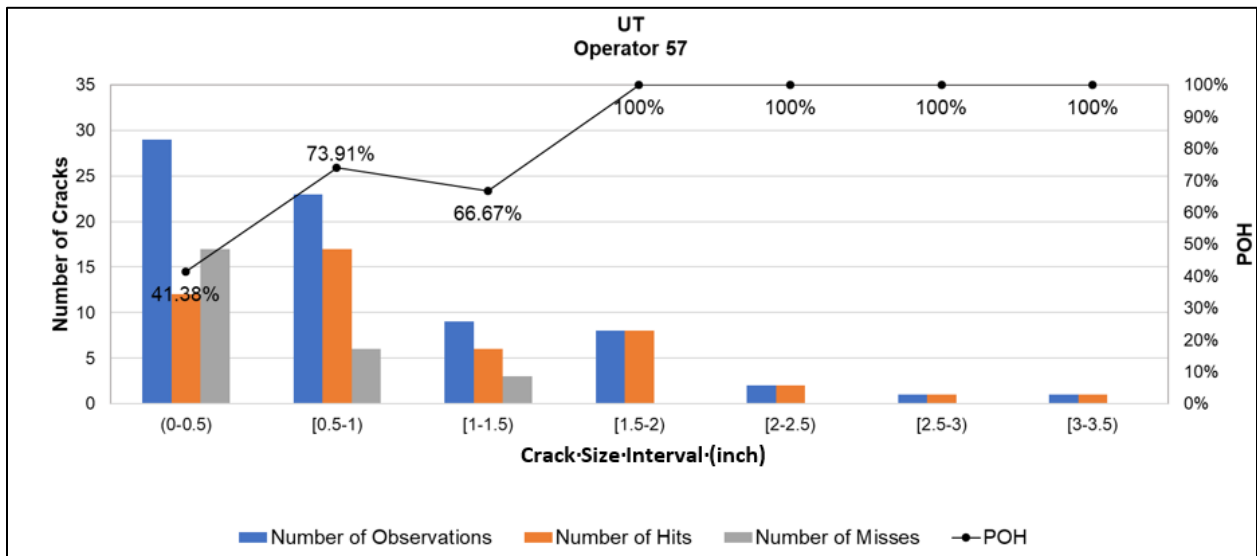


Figure 188. BW UT Distribution of Hits – Operator 57

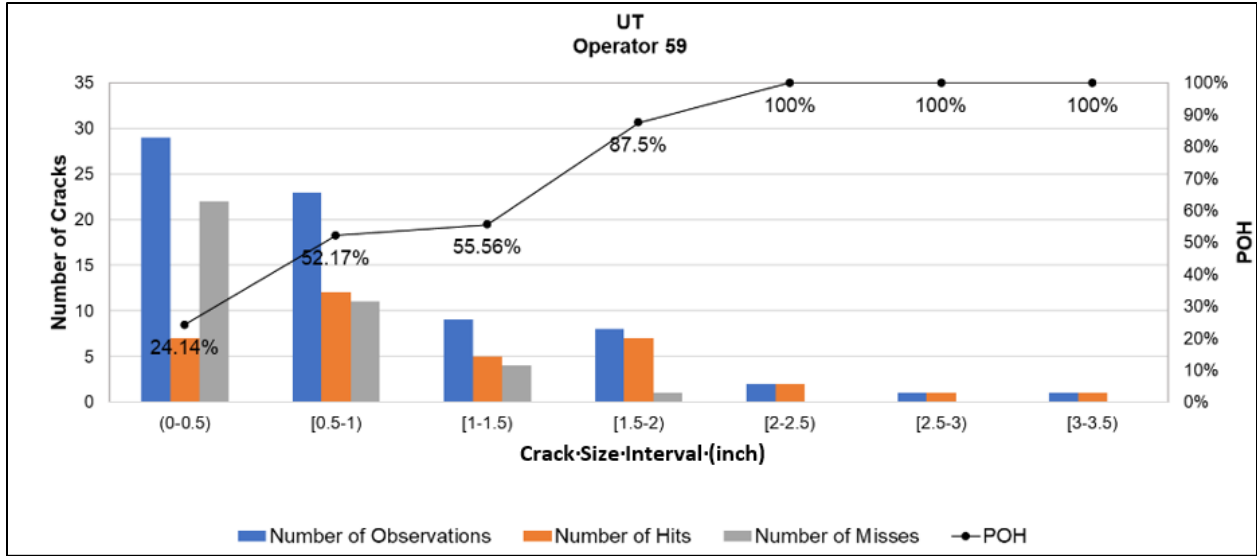


Figure 189. BW UT Distribution of Hits – Operator 59

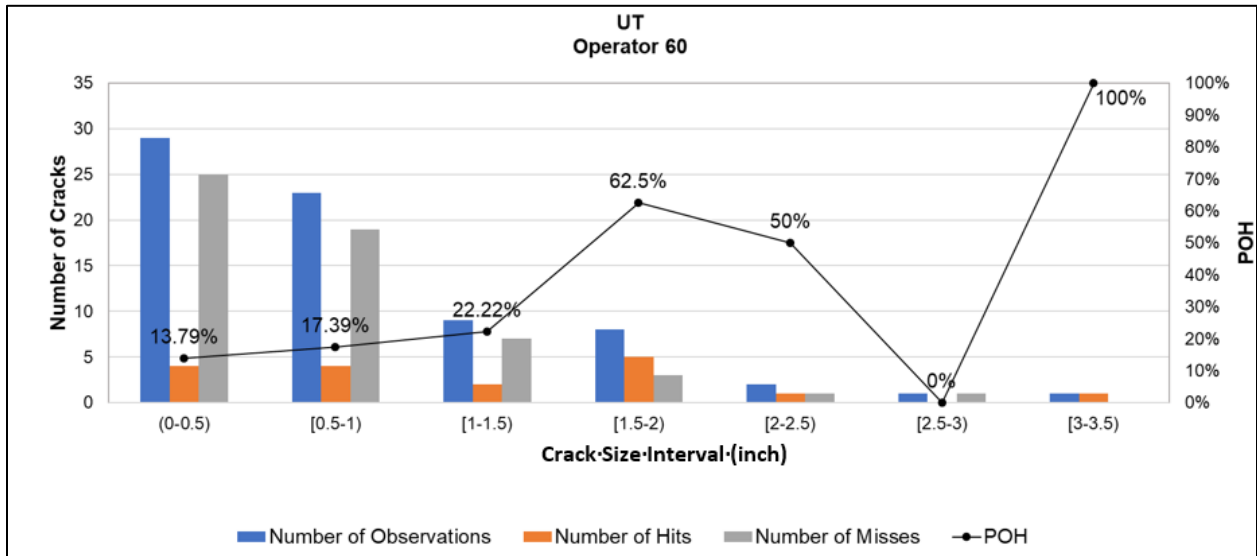


Figure 190. BW UT Distribution of Hits – Operator 60

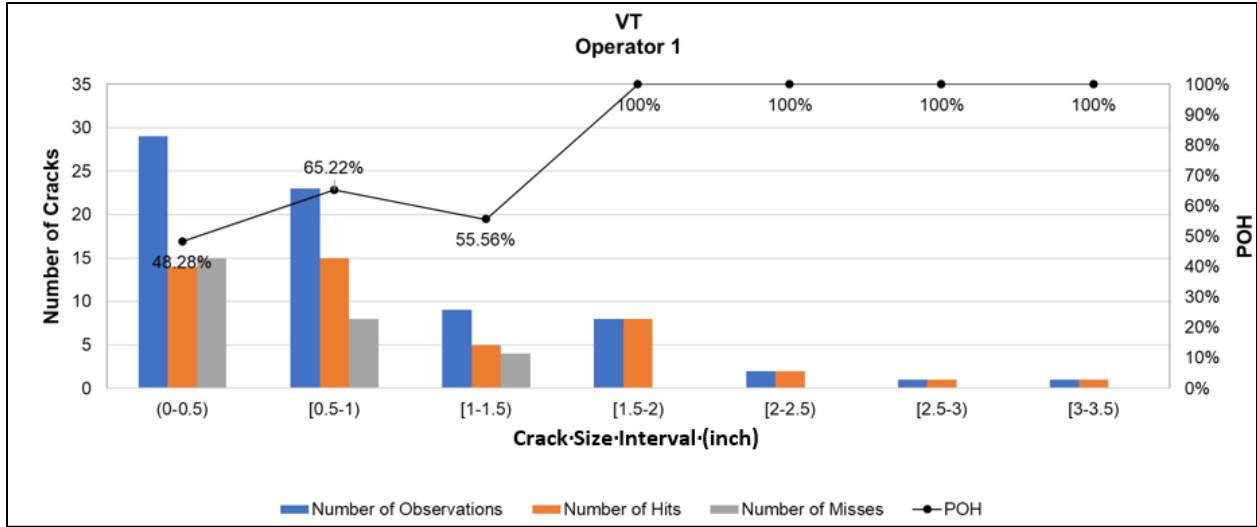


Figure 191. BW VT Distribution of Hits – Operator 1

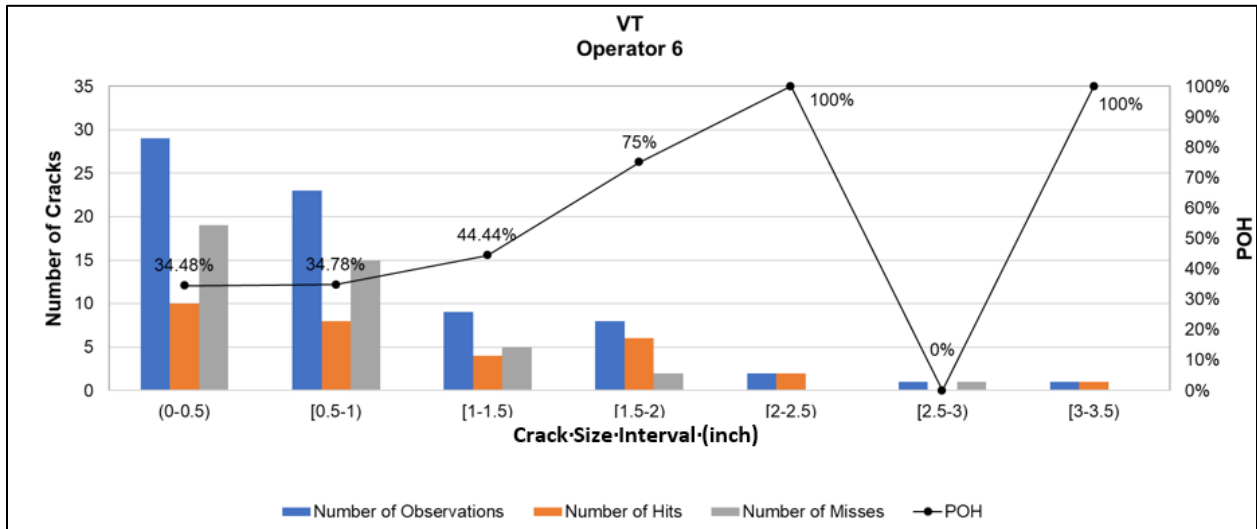


Figure 192. BW VT Distribution of Hits – Operator 6

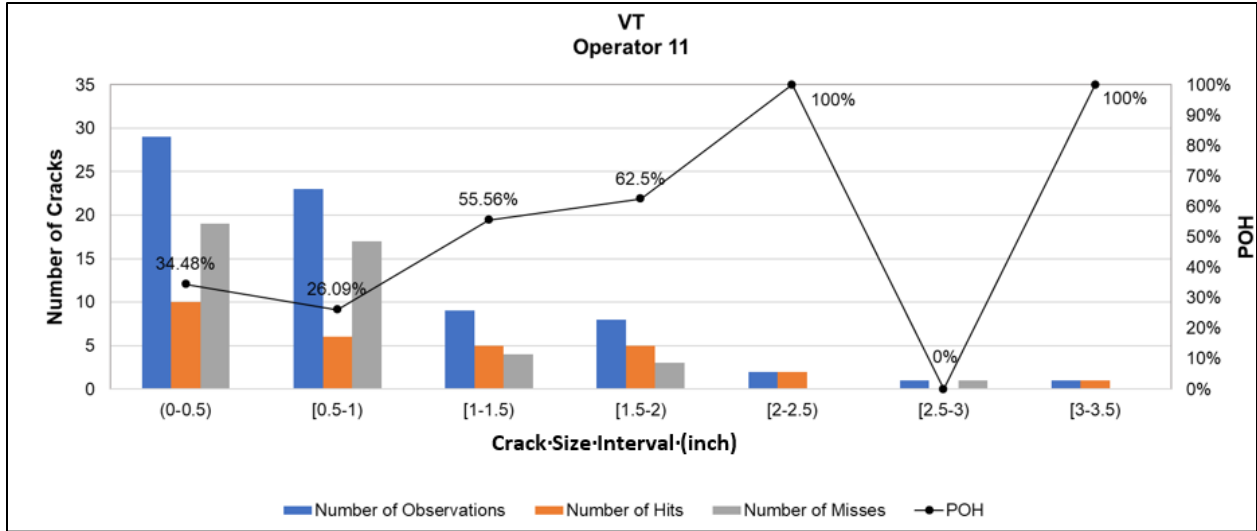


Figure 193. BW VT Distribution of Hits – Operator 11

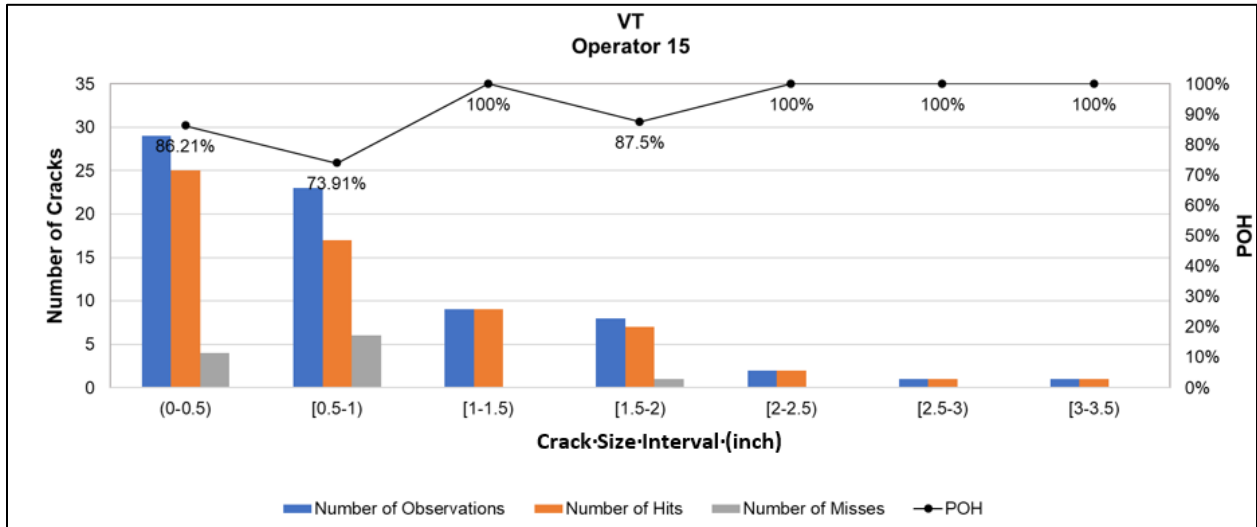


Figure 194. BW VT Distribution of Hits – Operator 15

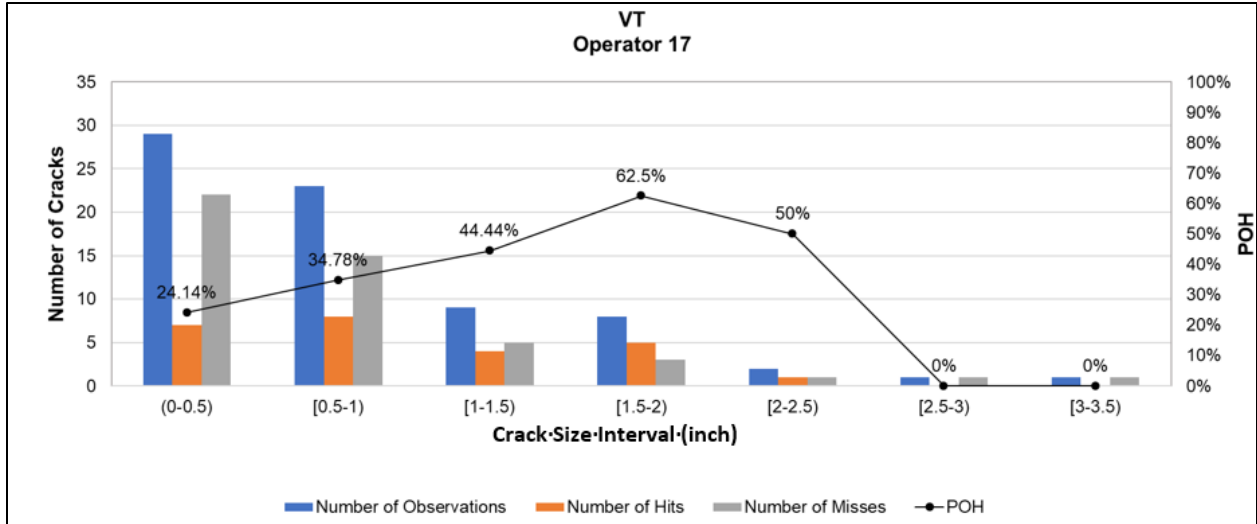


Figure 195. BW VT Distribution of Hits – Operator 17

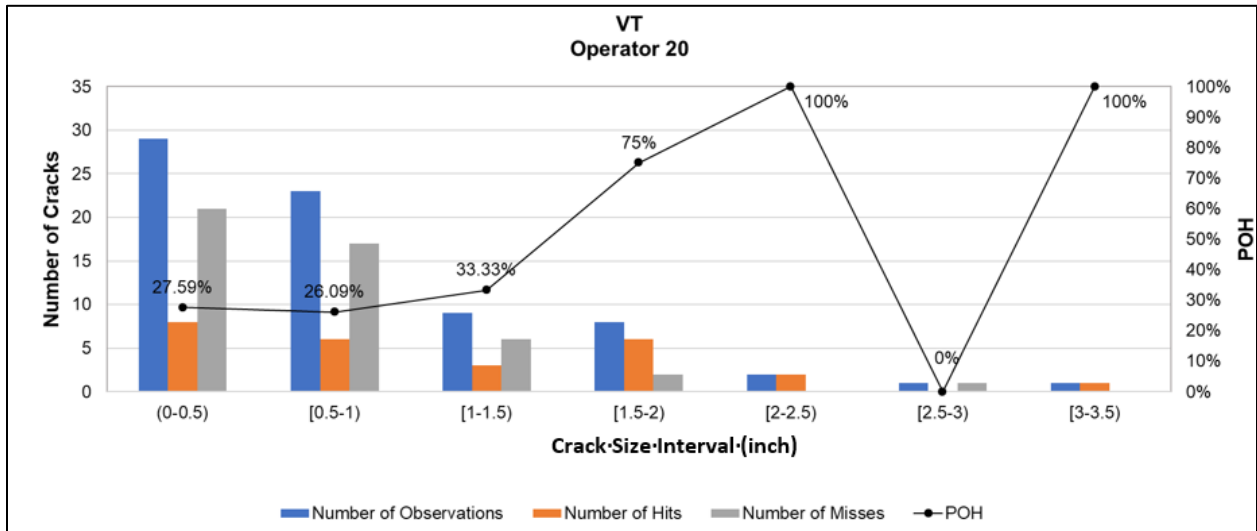


Figure 196. BW VT Distribution of Hits – Operator 20

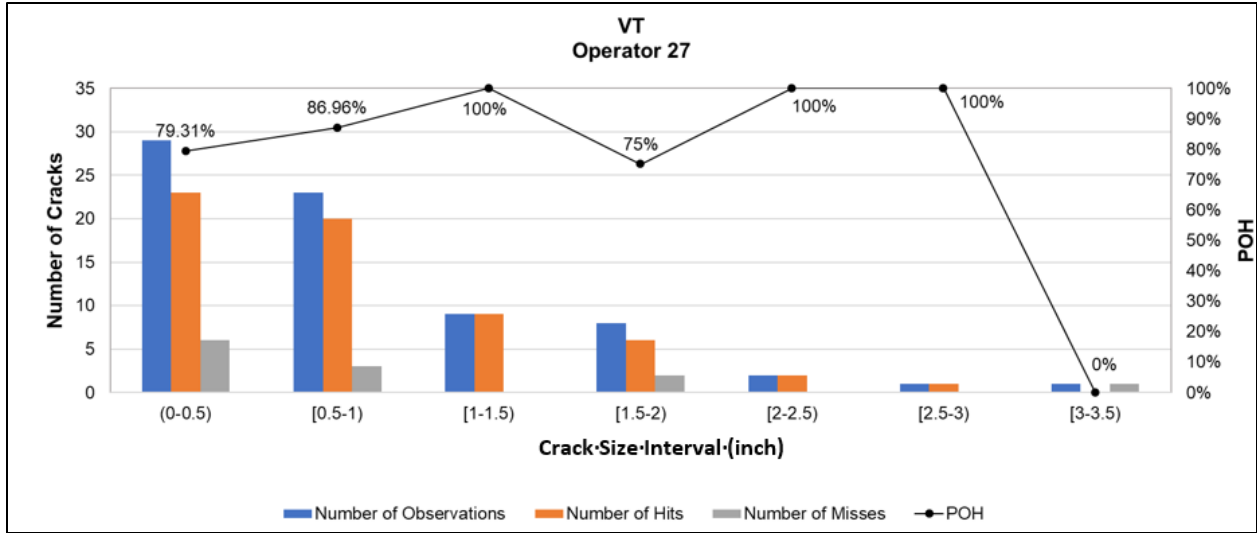


Figure 197. BW VT Distribution of Hits – Operator 27

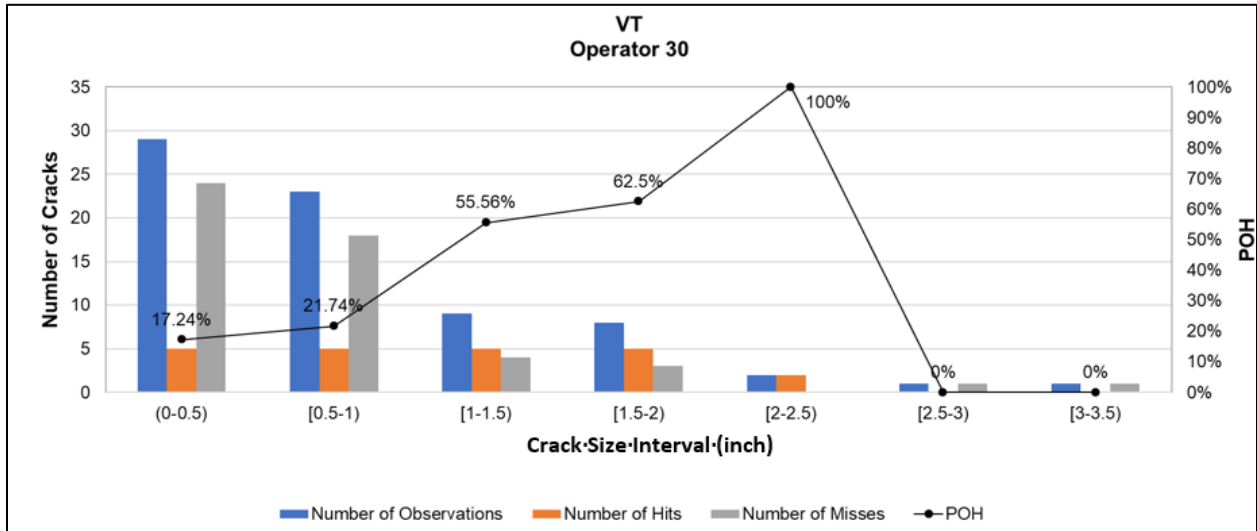


Figure 198. BW VT Distribution of Hits – Operator 30

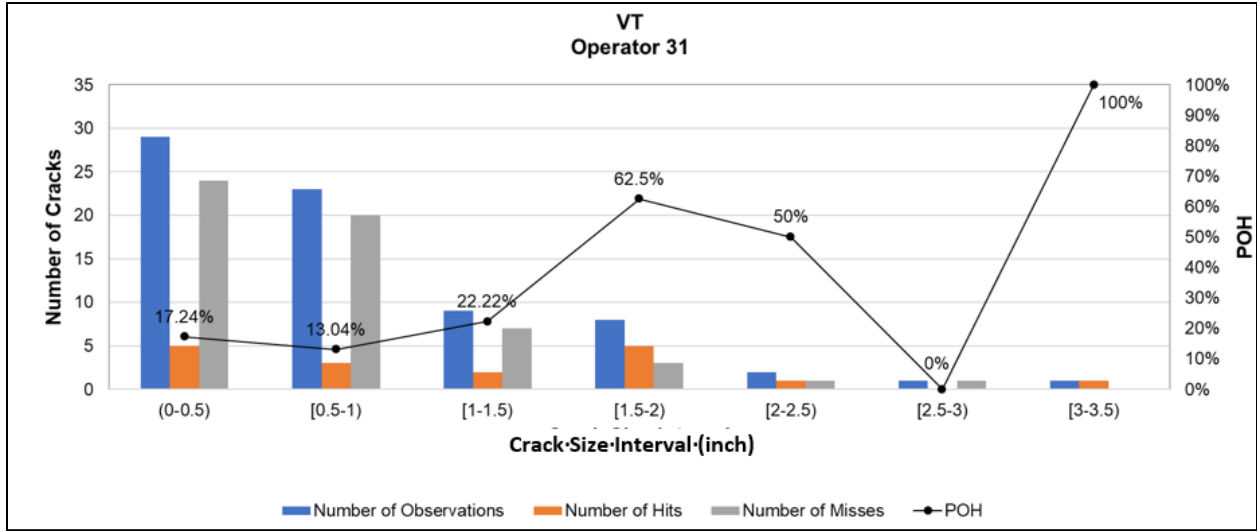


Figure 199. BW VT Distribution of Hits – Operator 31

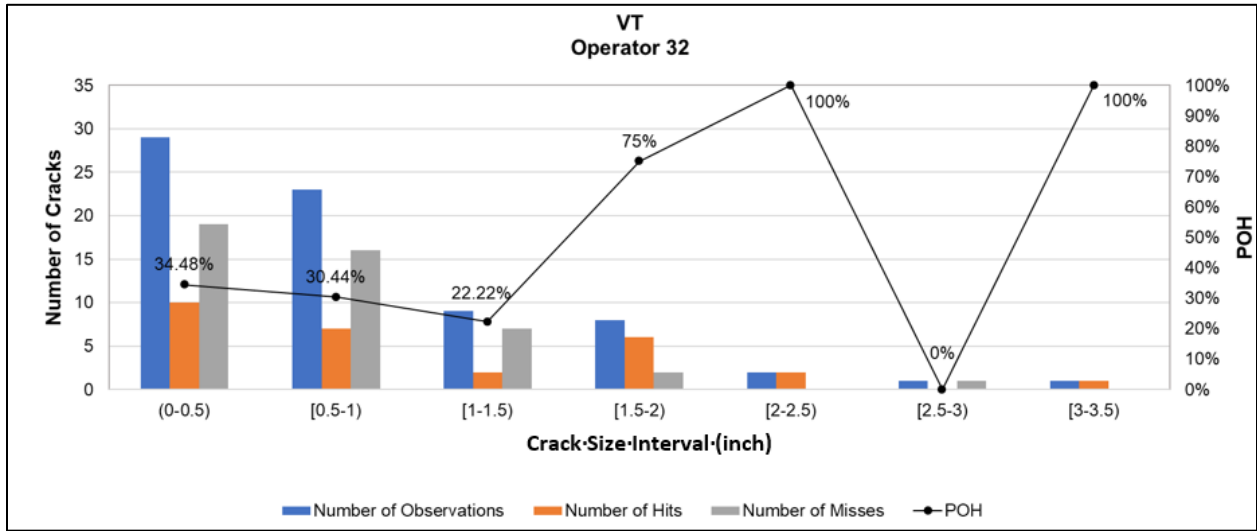


Figure 200. BW VT Distribution of Hits – Operator 32

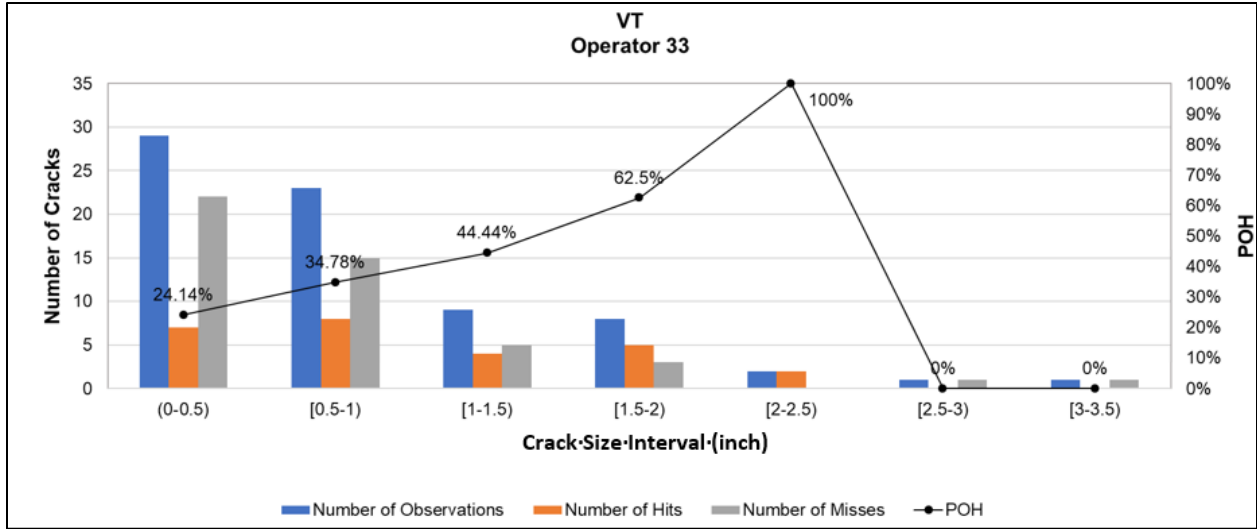


Figure 201. BW VT Distribution of Hits – Operator 33

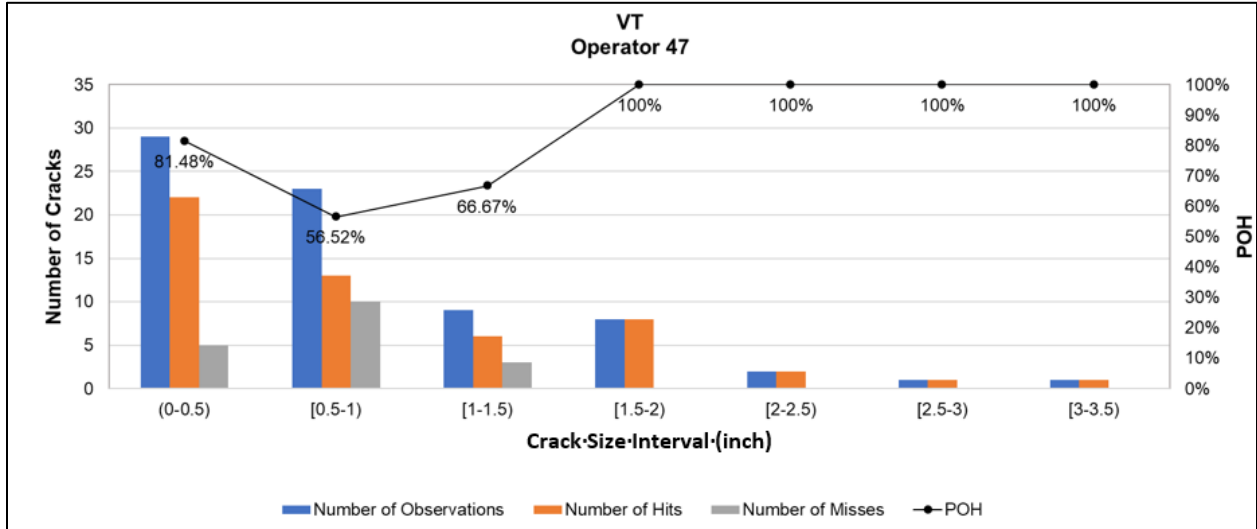


Figure 202. BW VT Distribution of Hits – Operator 47

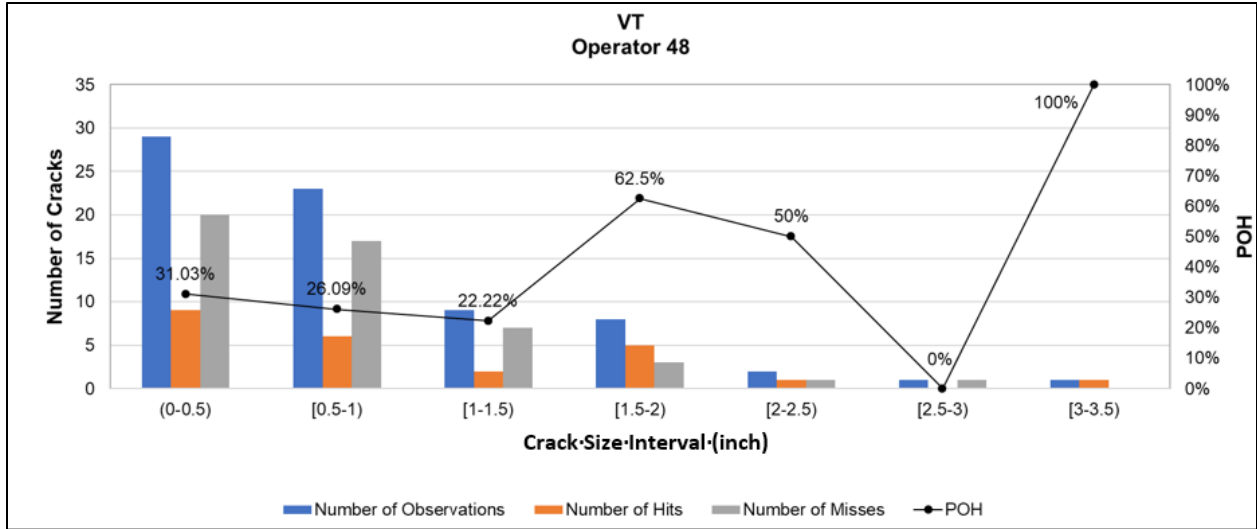


Figure 203. BW VT Distribution of Hits – Operator 48

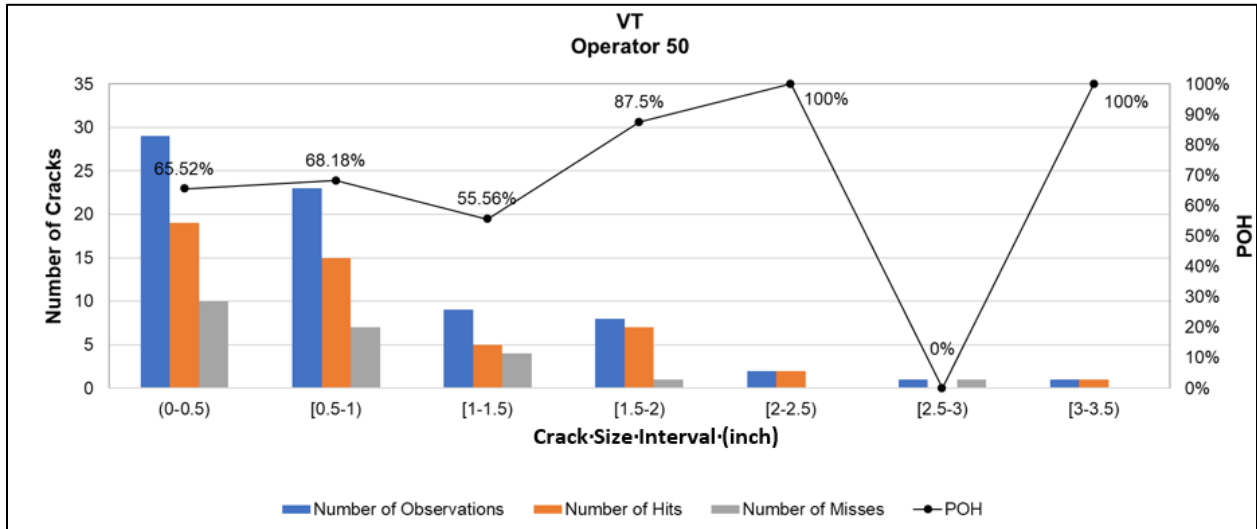


Figure 204. BW VT Distribution of Hits – Operator 50

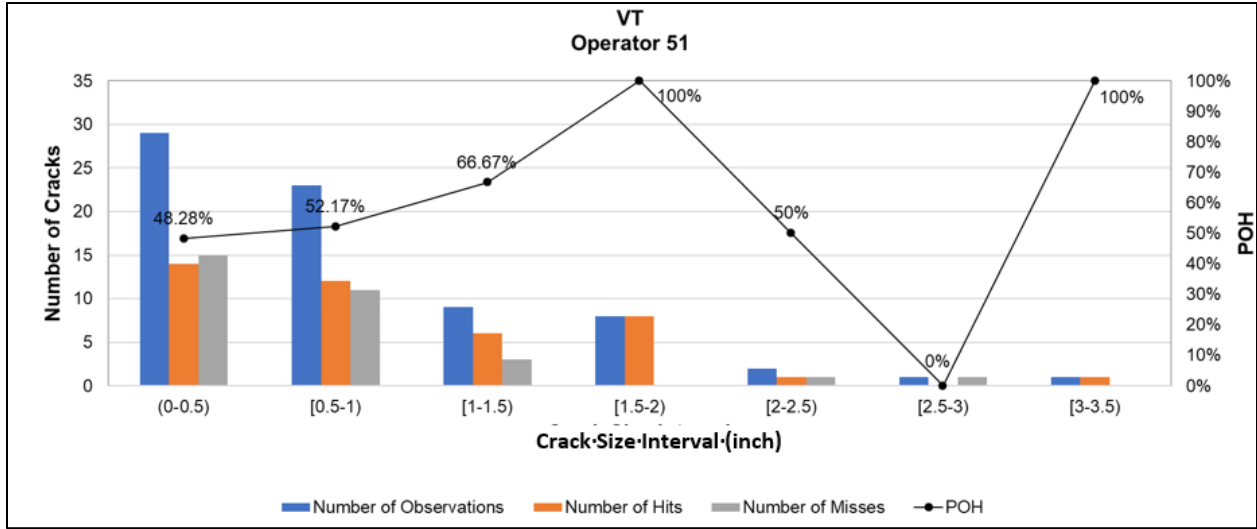


Figure 205. BW VT Distribution of Hits – Operator 51

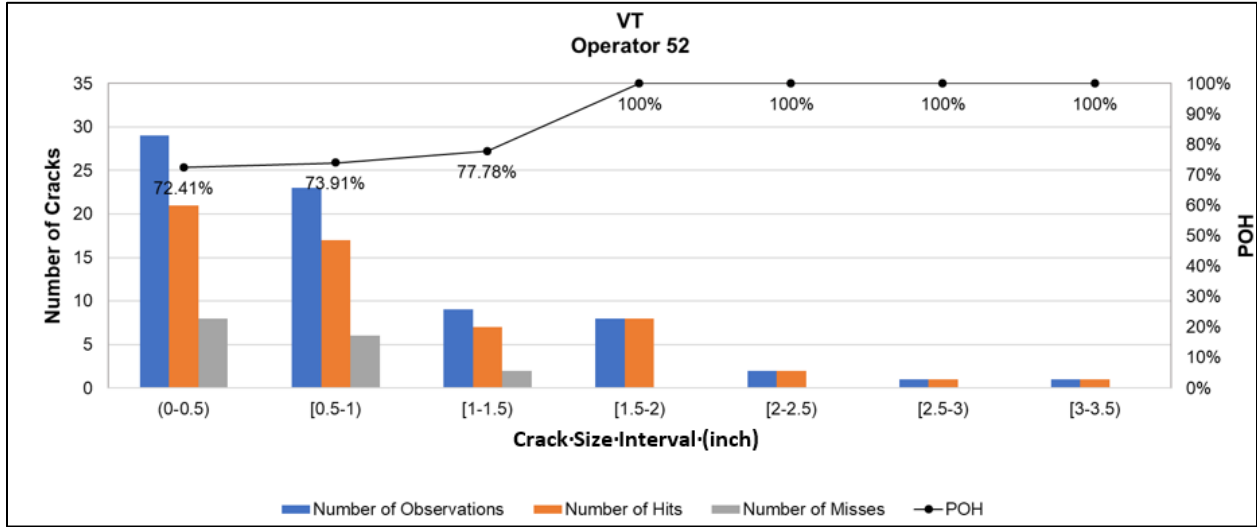


Figure 206. BW VT Distribution of Hits – Operator 52

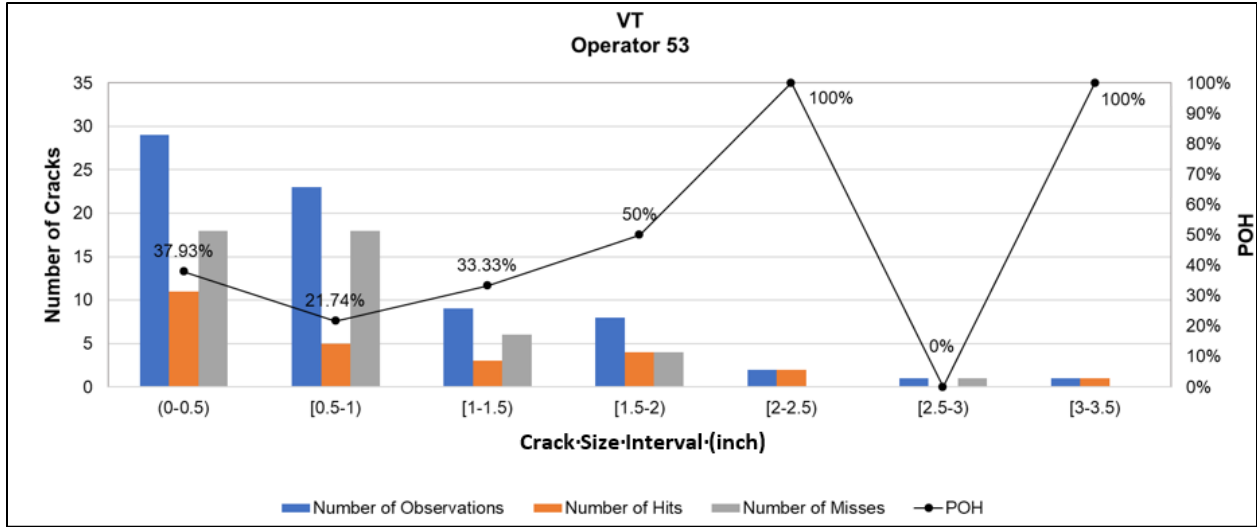


Figure 207. BW VT Distribution of Hits – Operator 53

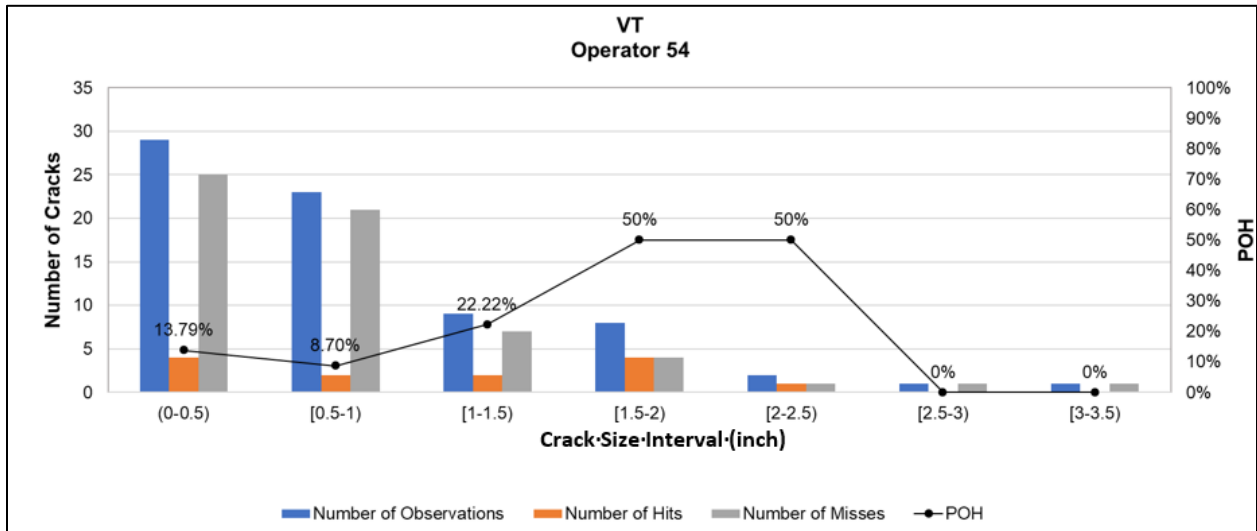


Figure 208. BW VT Distribution of Hits – Operator 54

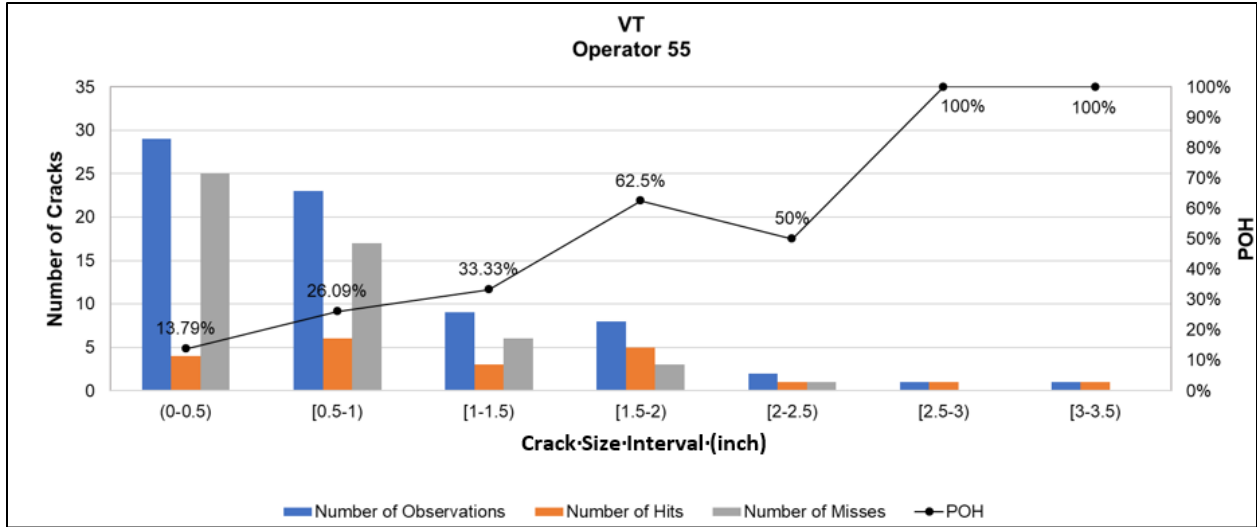


Figure 209. BW VT Distribution of Hits – Operator 55

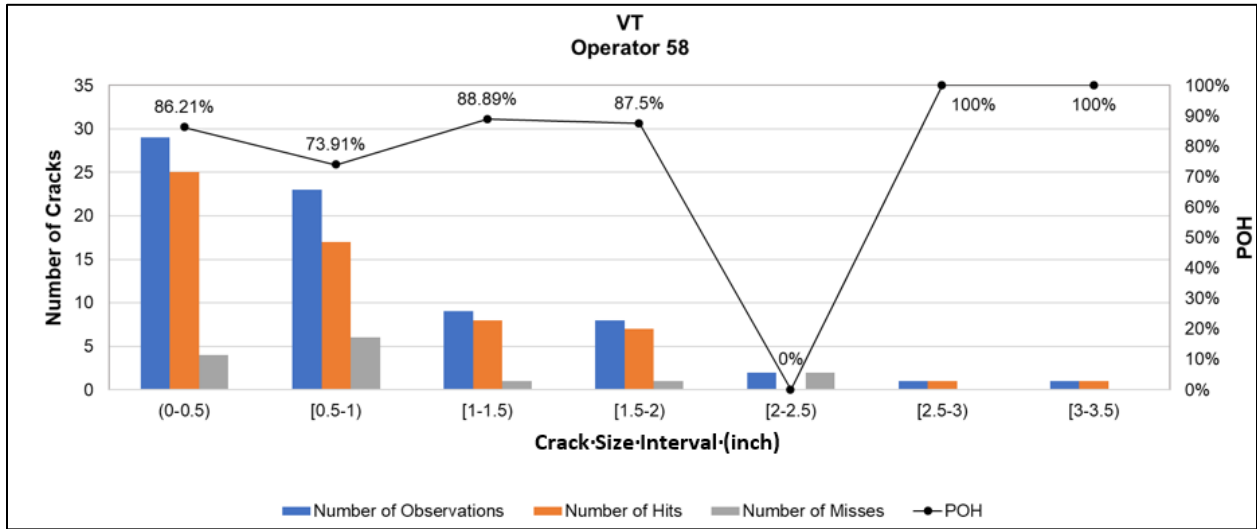


Figure 210. BW VT Distribution of Hits – Operator 58

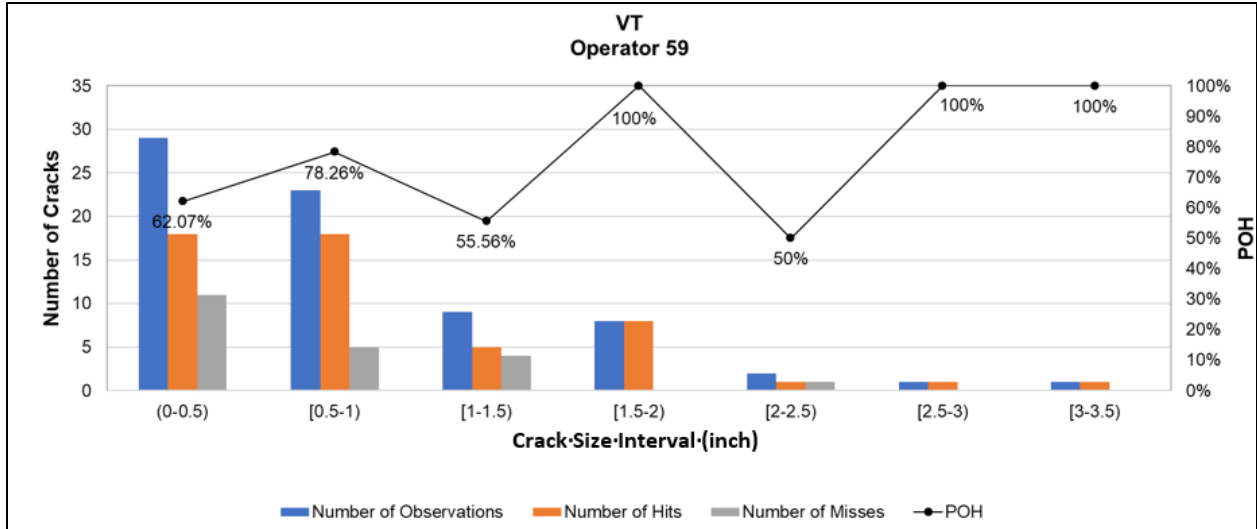


Figure 211. BW VT Distribution of Hits – Operator 59

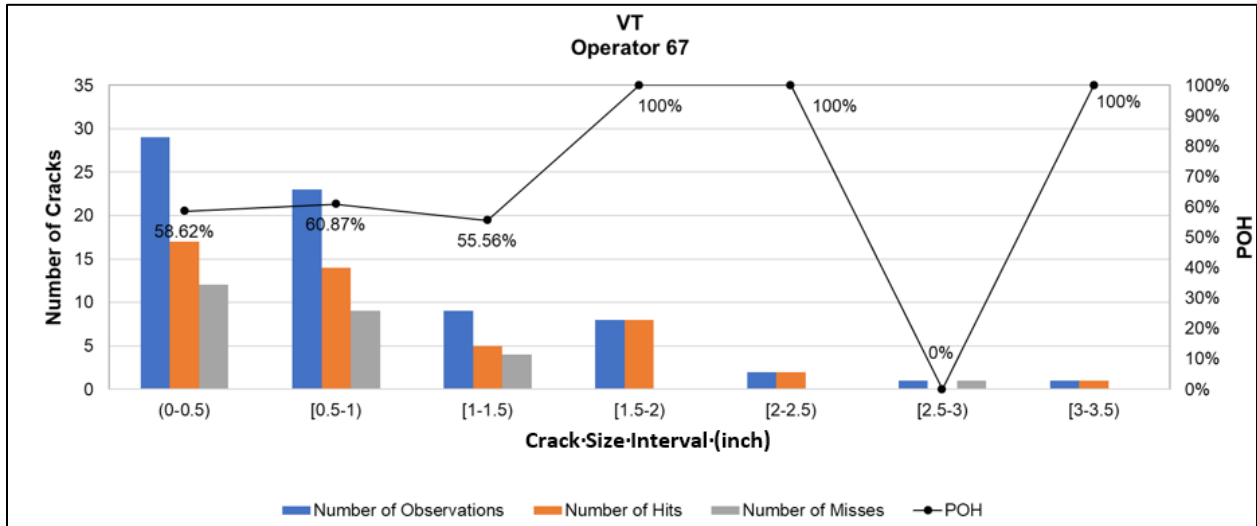


Figure 212. BW VT Distribution of Hits – Operator 67

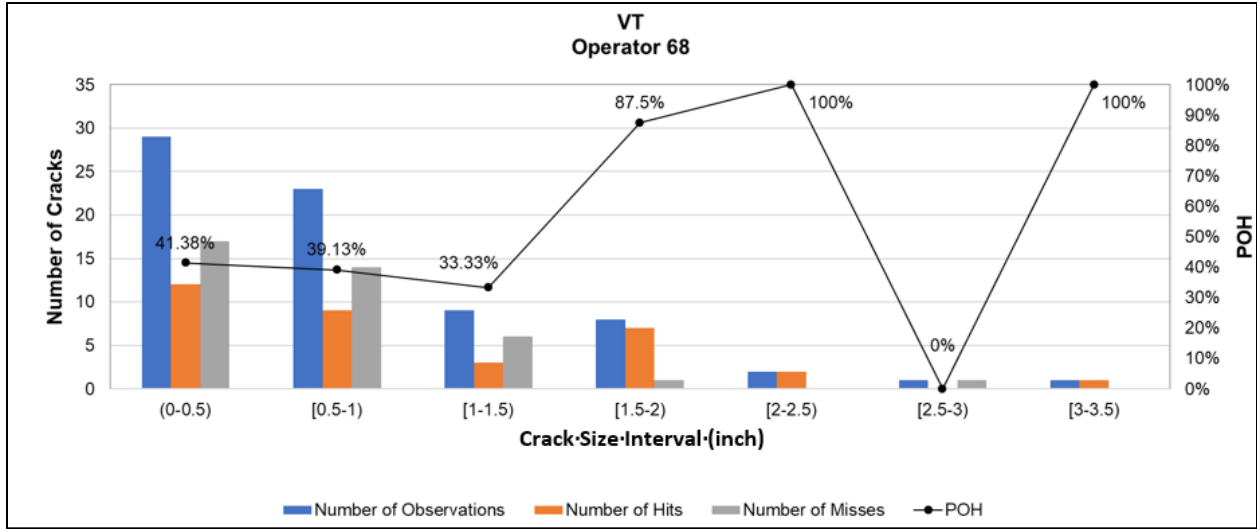


Figure 213. BW VT Distribution of Hits – Operator 68

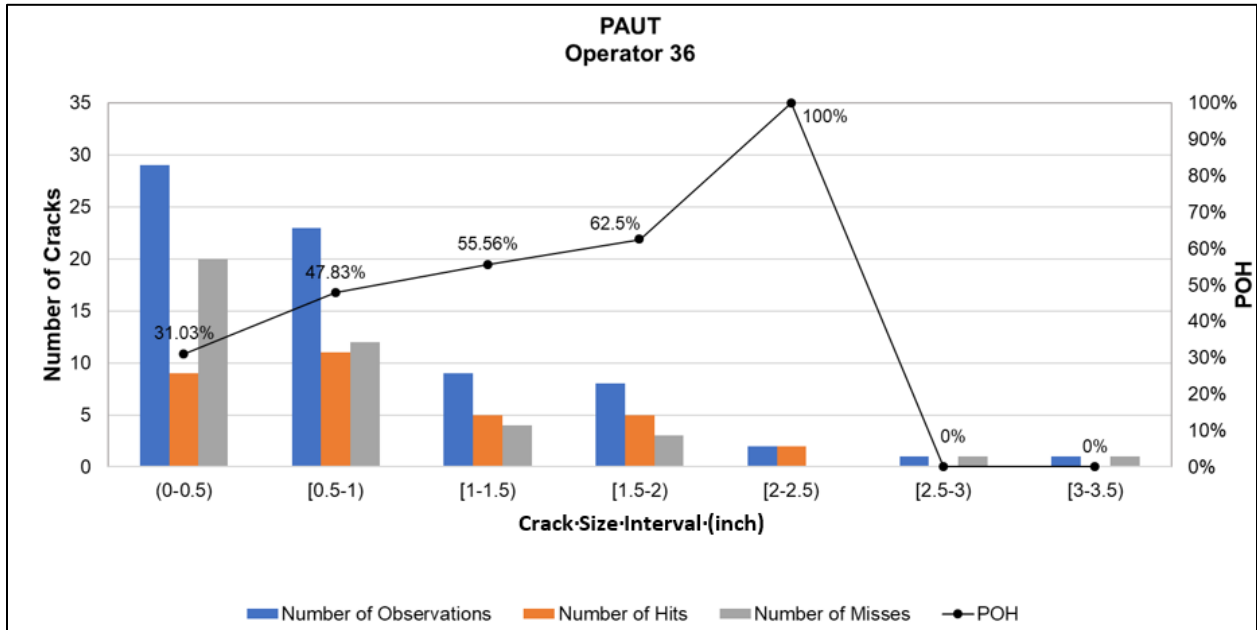


Figure 214. BW PAUT Distribution of Hits – Operator 36

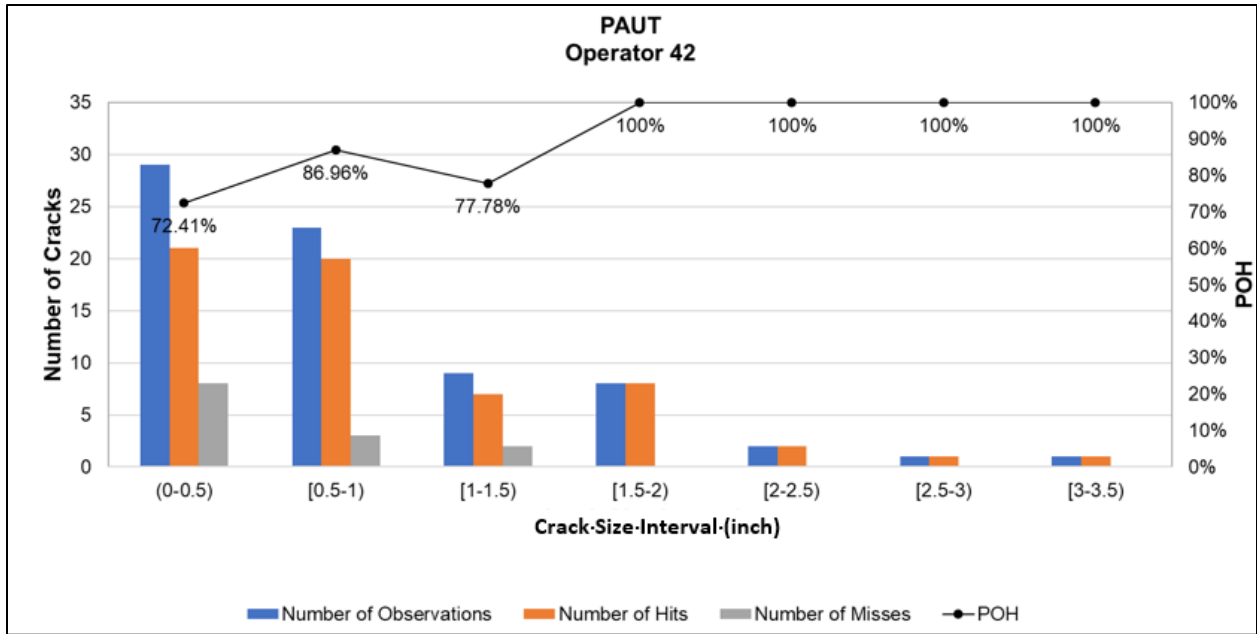


Figure 215. BW PAUT Distribution of Hits – Operator 42

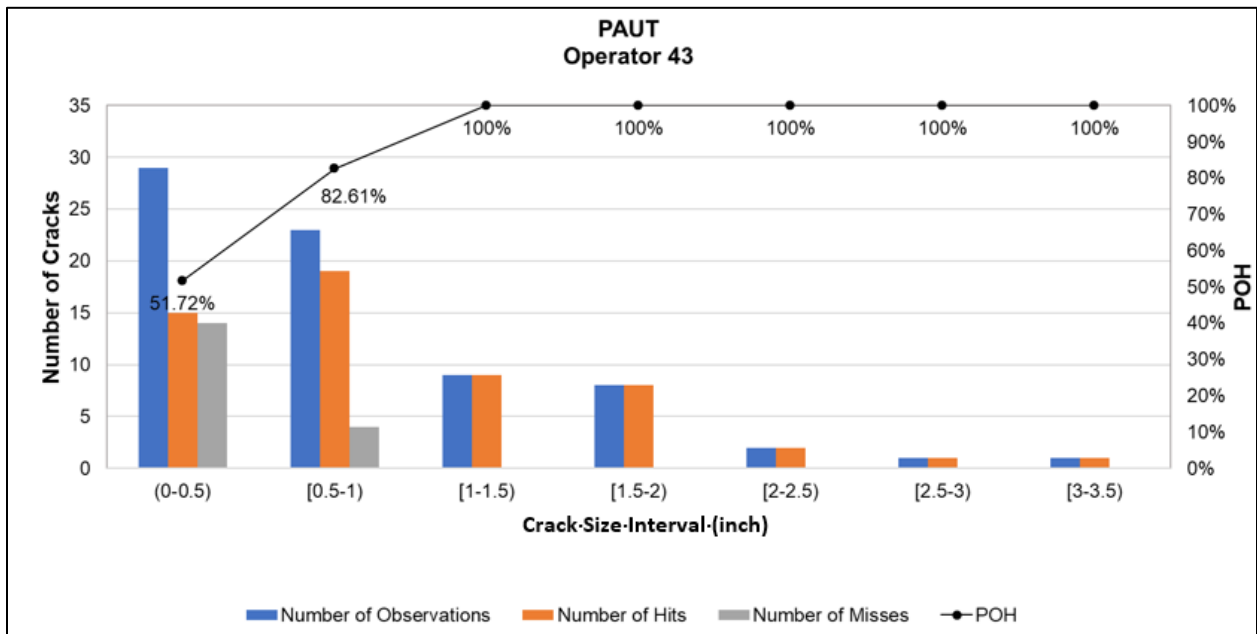


Figure 216. BW PAUT Distribution of Hits – Operator 43

Appendix E. DOEPOD Plots – Fillet Welds

This appendix illustrates DOEPOD plot-fillet welds in [Figure 217](#) through [Figure 306](#).

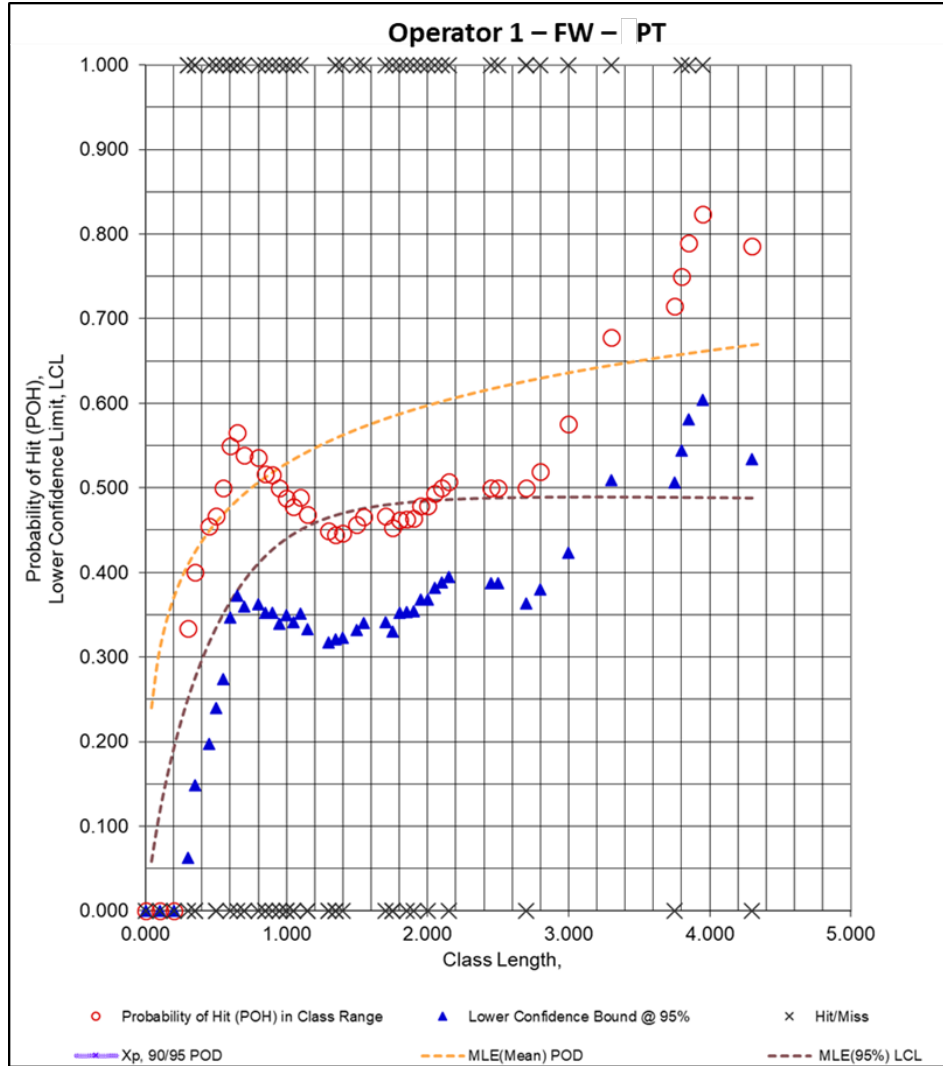


Figure 217. DOEPOD – FW – PT – Operator 1

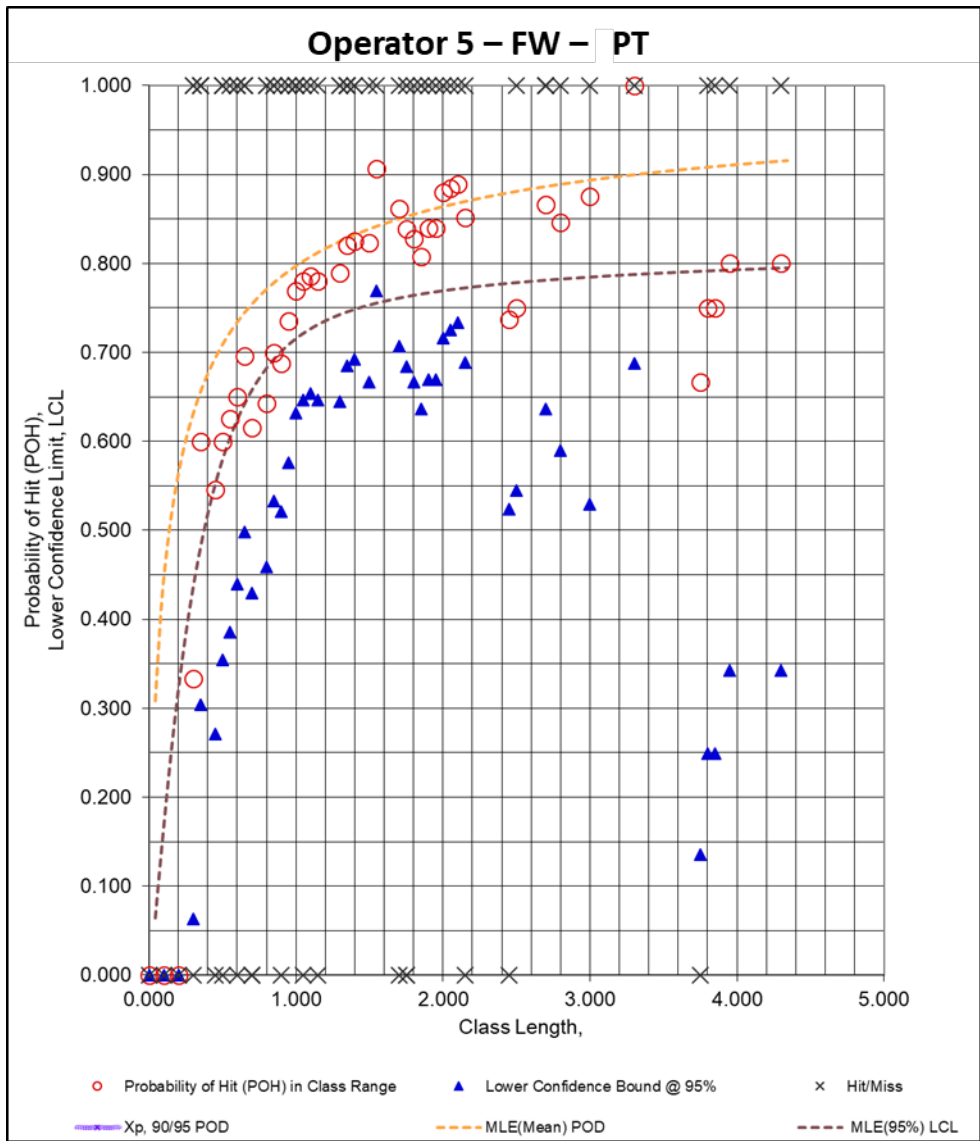


Figure 218. DOEPOD – FW – PT – Operator 5

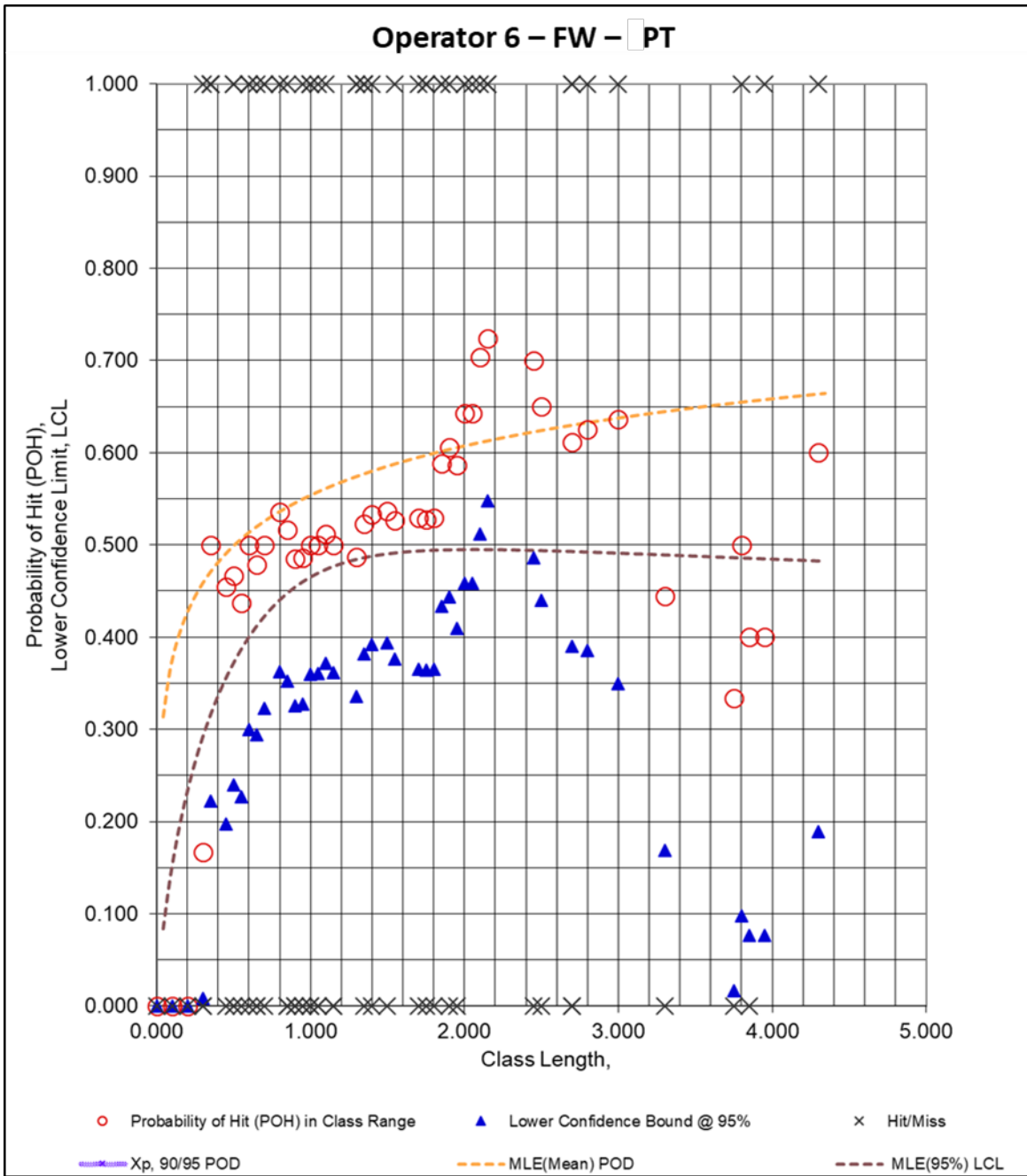


Figure 219. DOEPOD – FW – PT – Operator 6

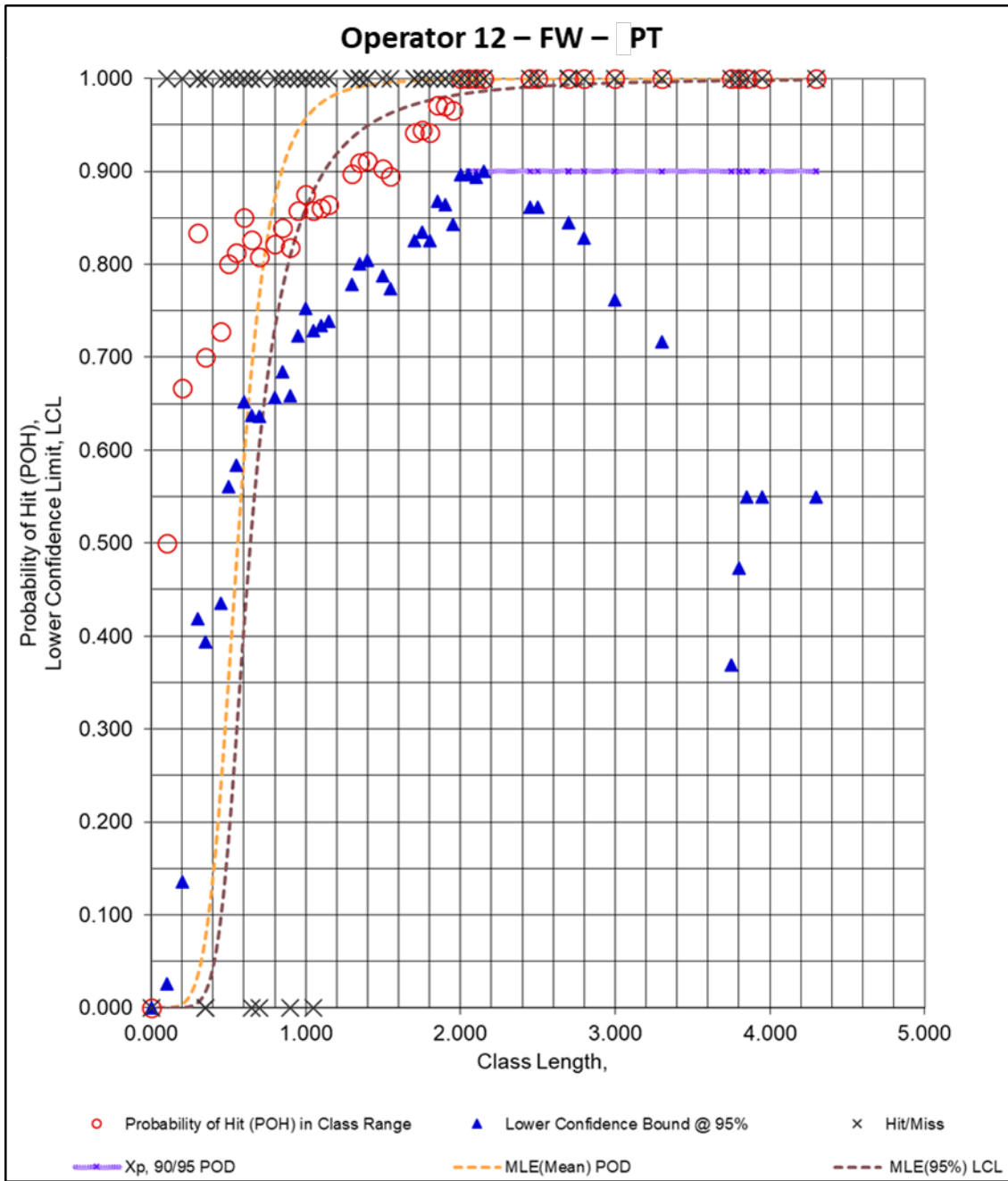


Figure 220. DOEPOD – FW – PT – Operator 12

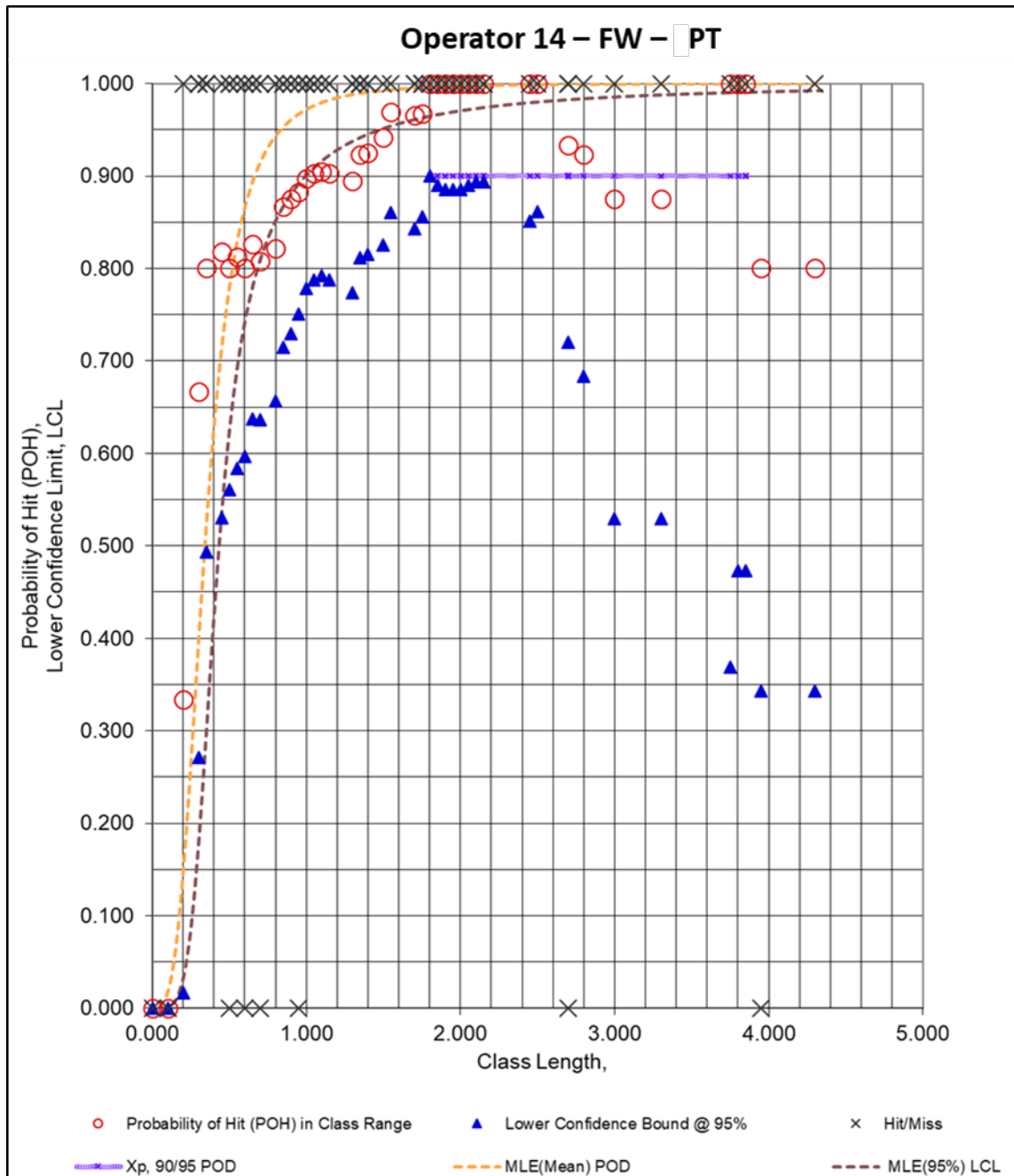


Figure 221. DOEPOD – FW – PT – Operator 14

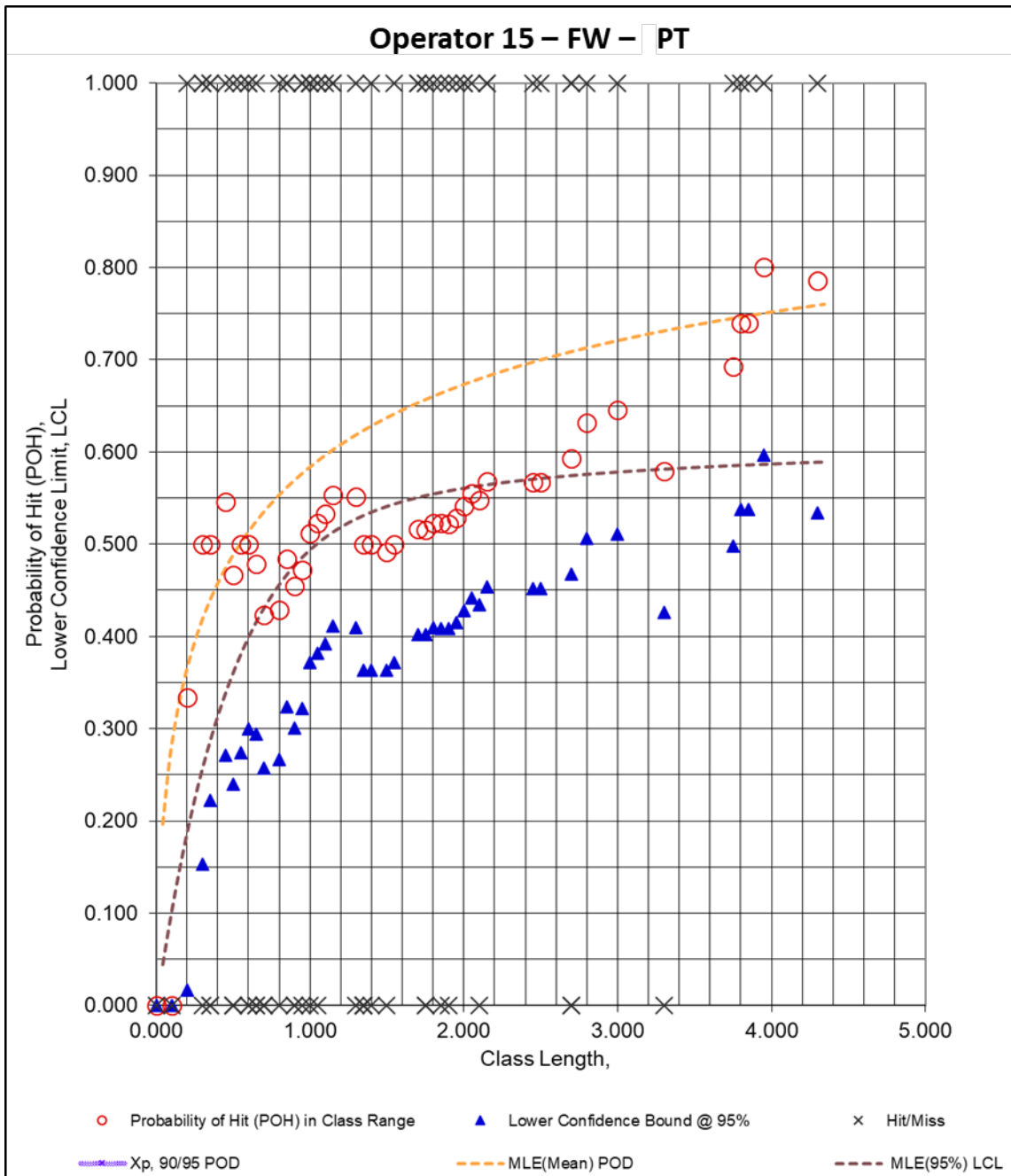


Figure 222. DOEPOD – FW – PT – Operator 15

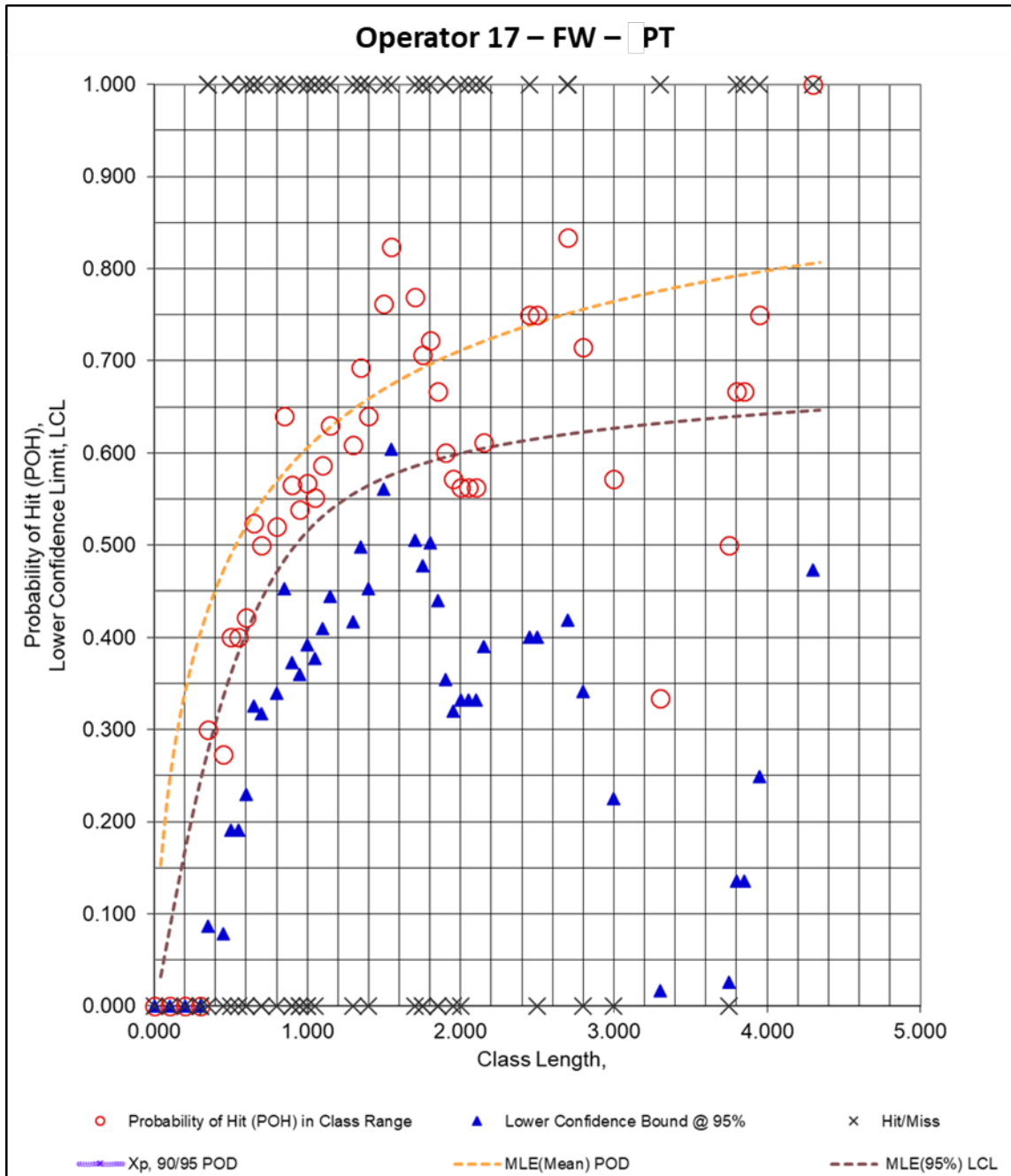


Figure 223. DOEPOD – FW – PT – Operator 17

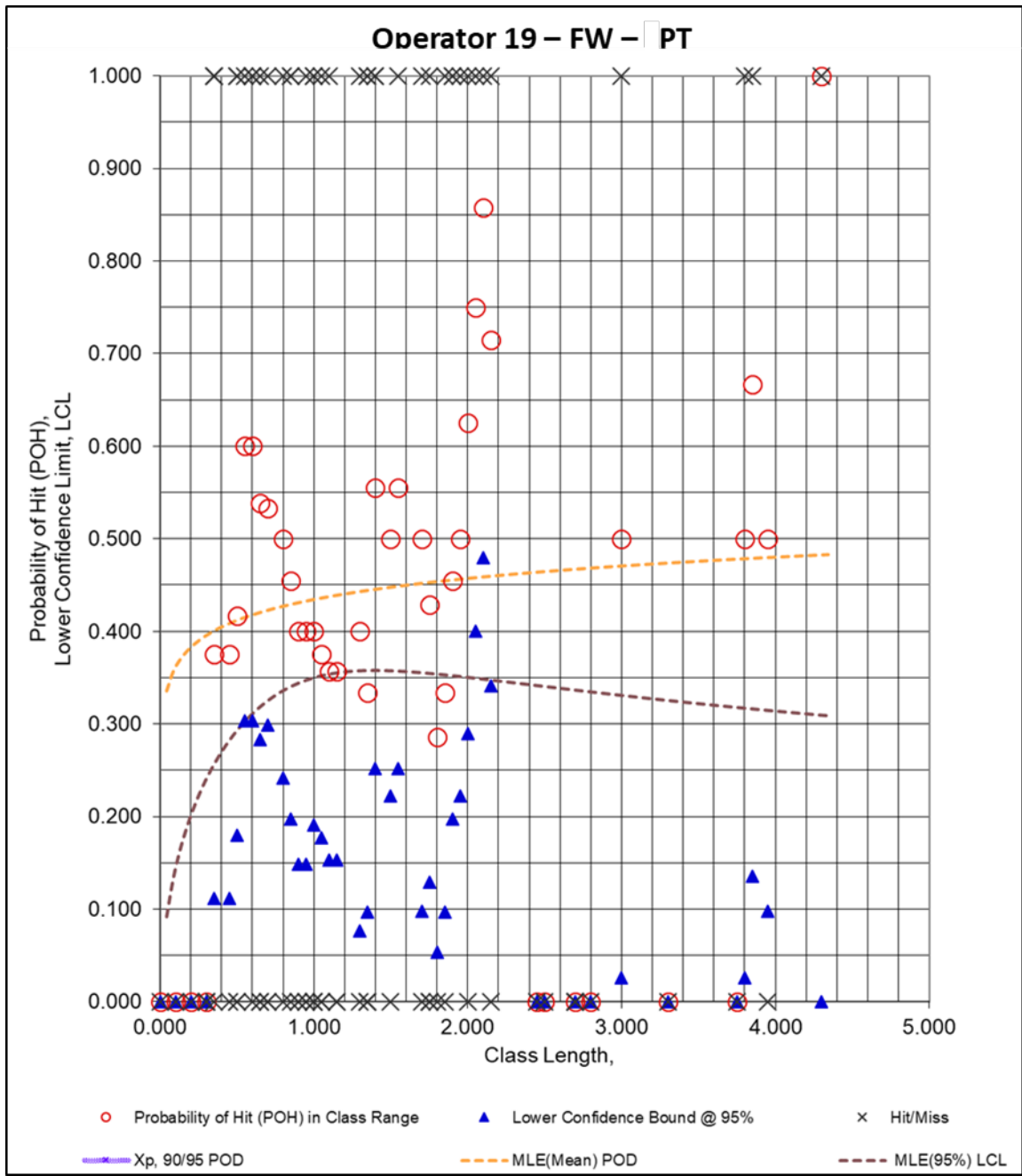


Figure 224. DOEPOD – FW – PT – Operator 19

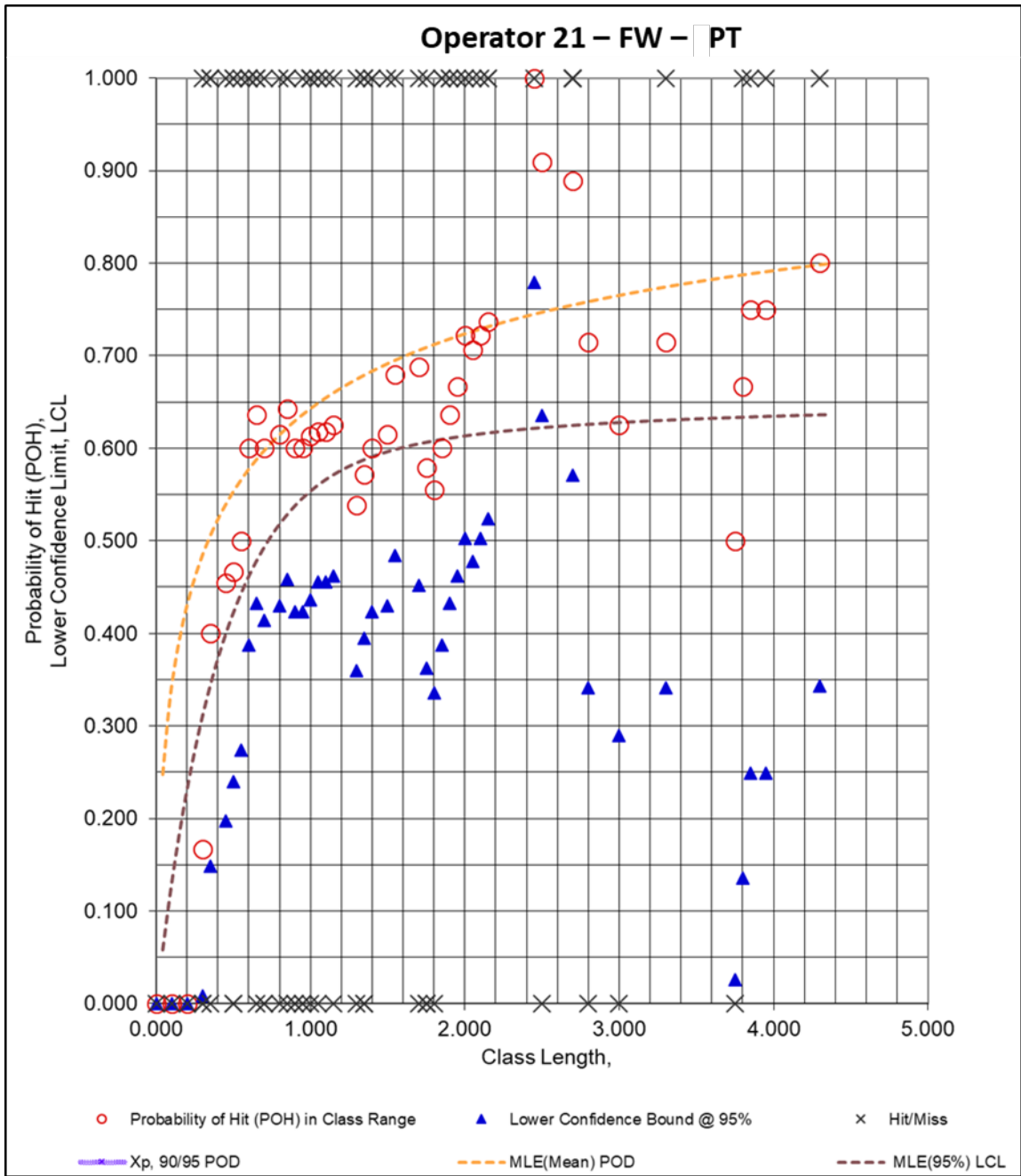


Figure 225. DOEPOD – FW – PT – Operator 21

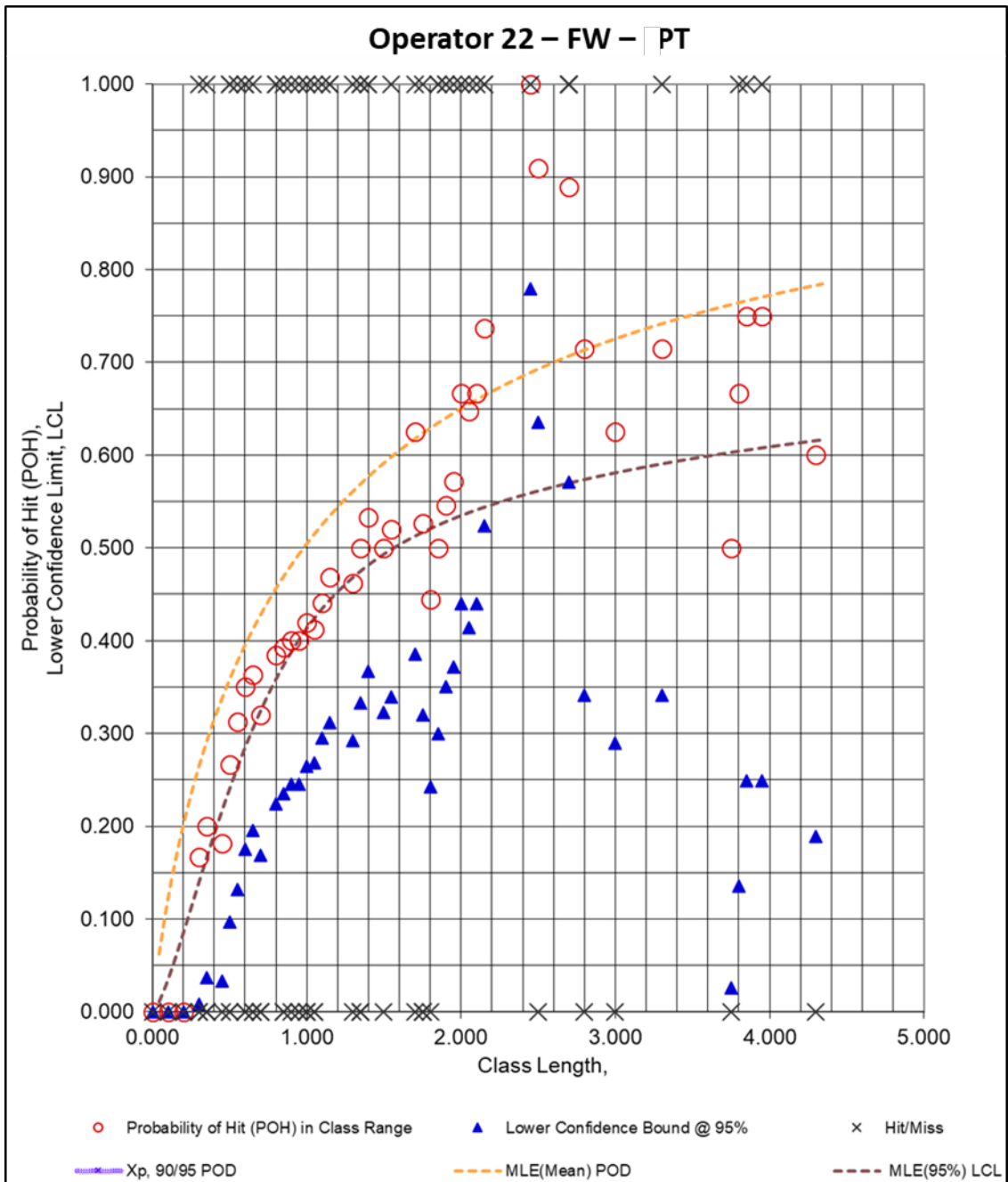


Figure 226. DOEPOD – FW – PT – Operator 22

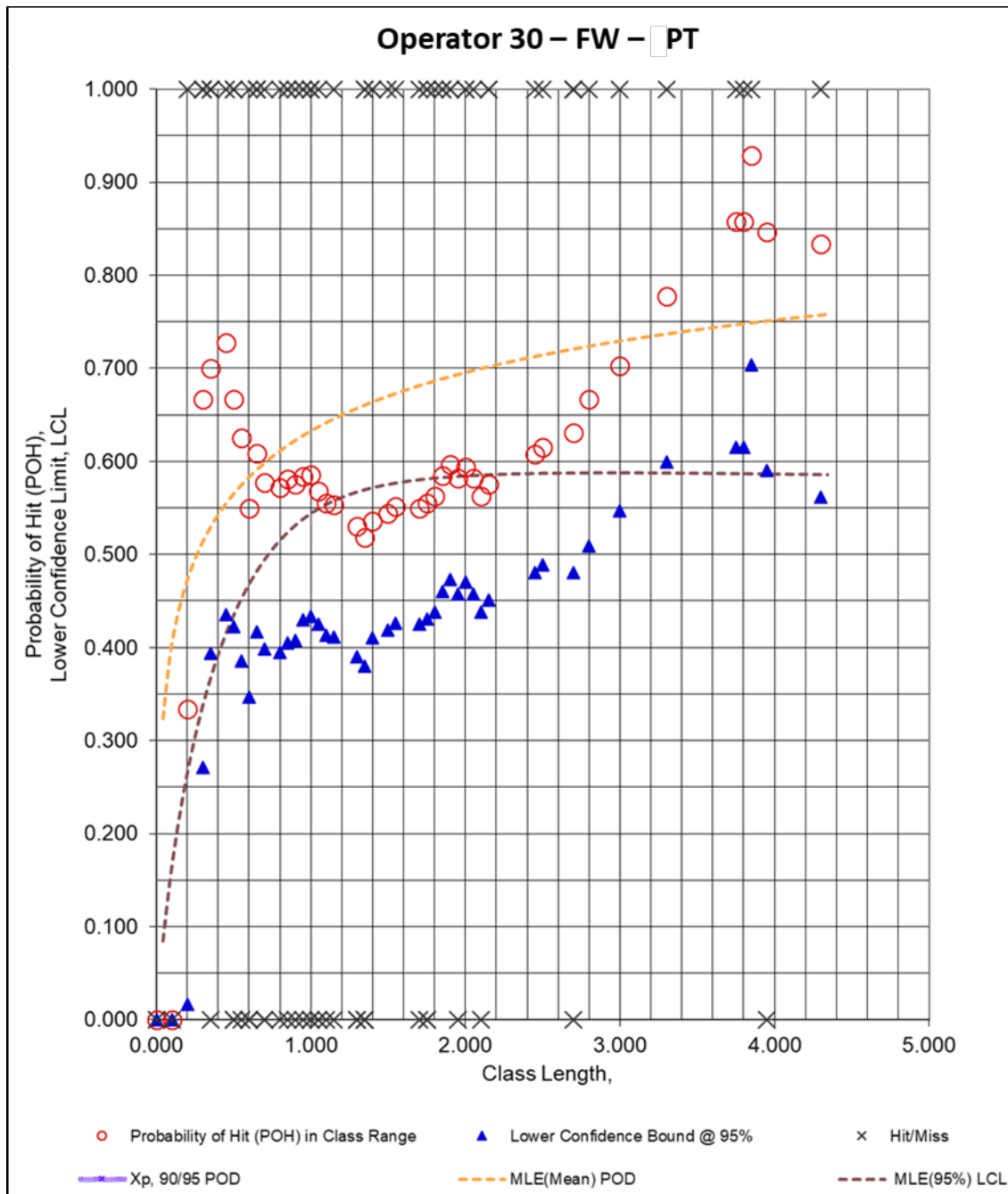


Figure 227. DOEPOD – FW – PT – Operator 30

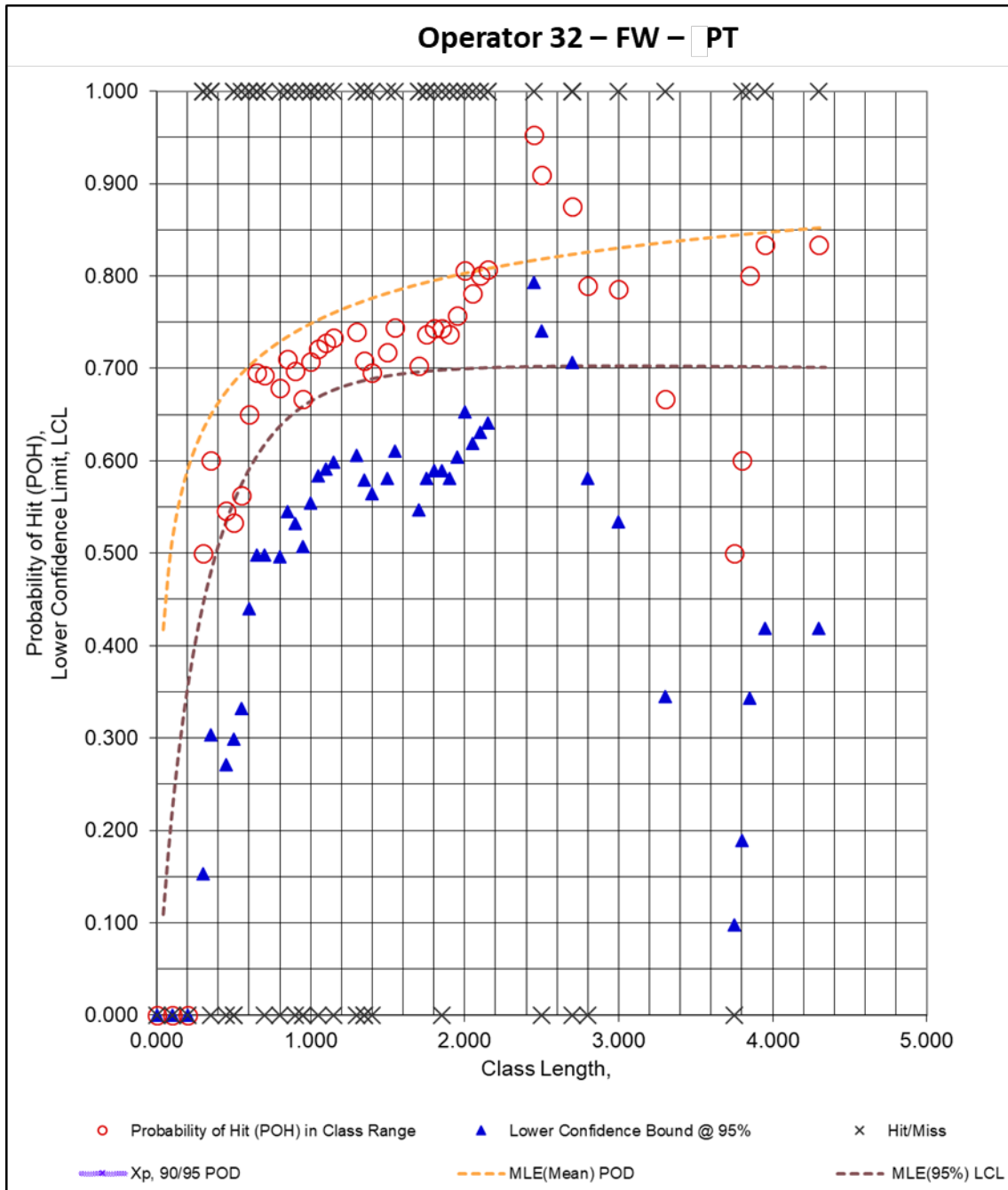


Figure 228. DOEPOD – FW – PT – Operator 32

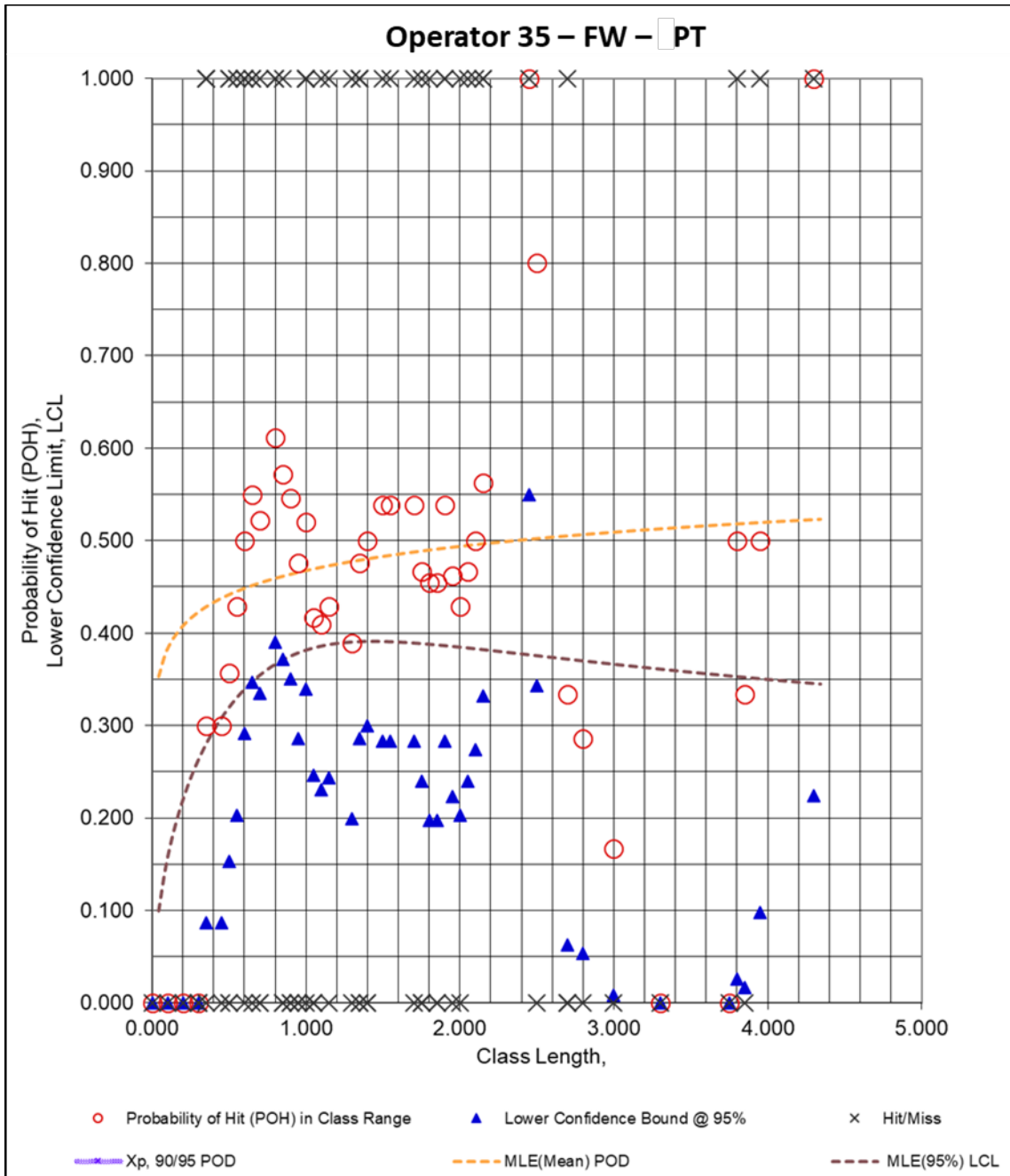


Figure 229. DOEPOD – FW – PT – Operator 35

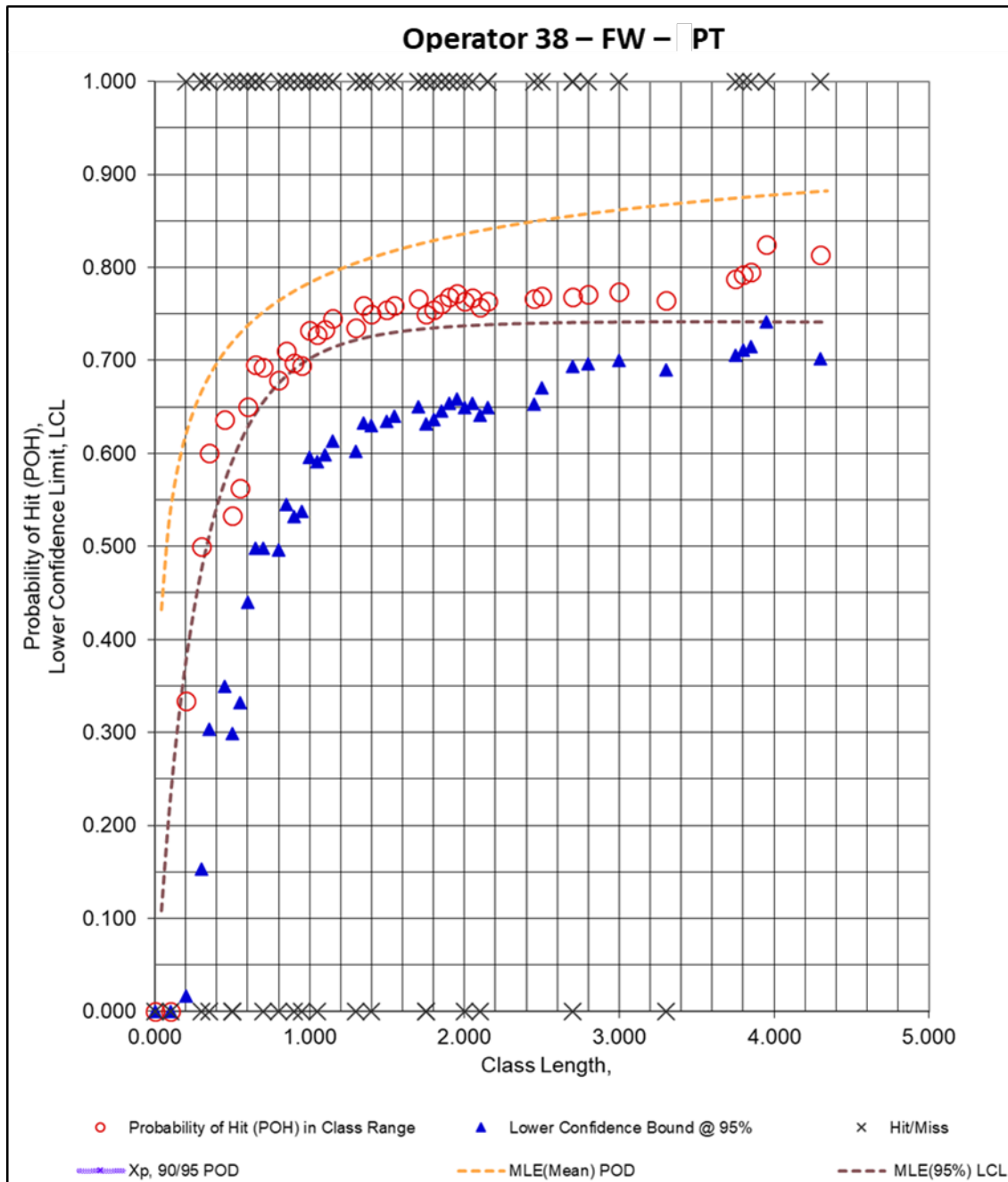


Figure 230. DOEPOD – FW – PT – Operator 38

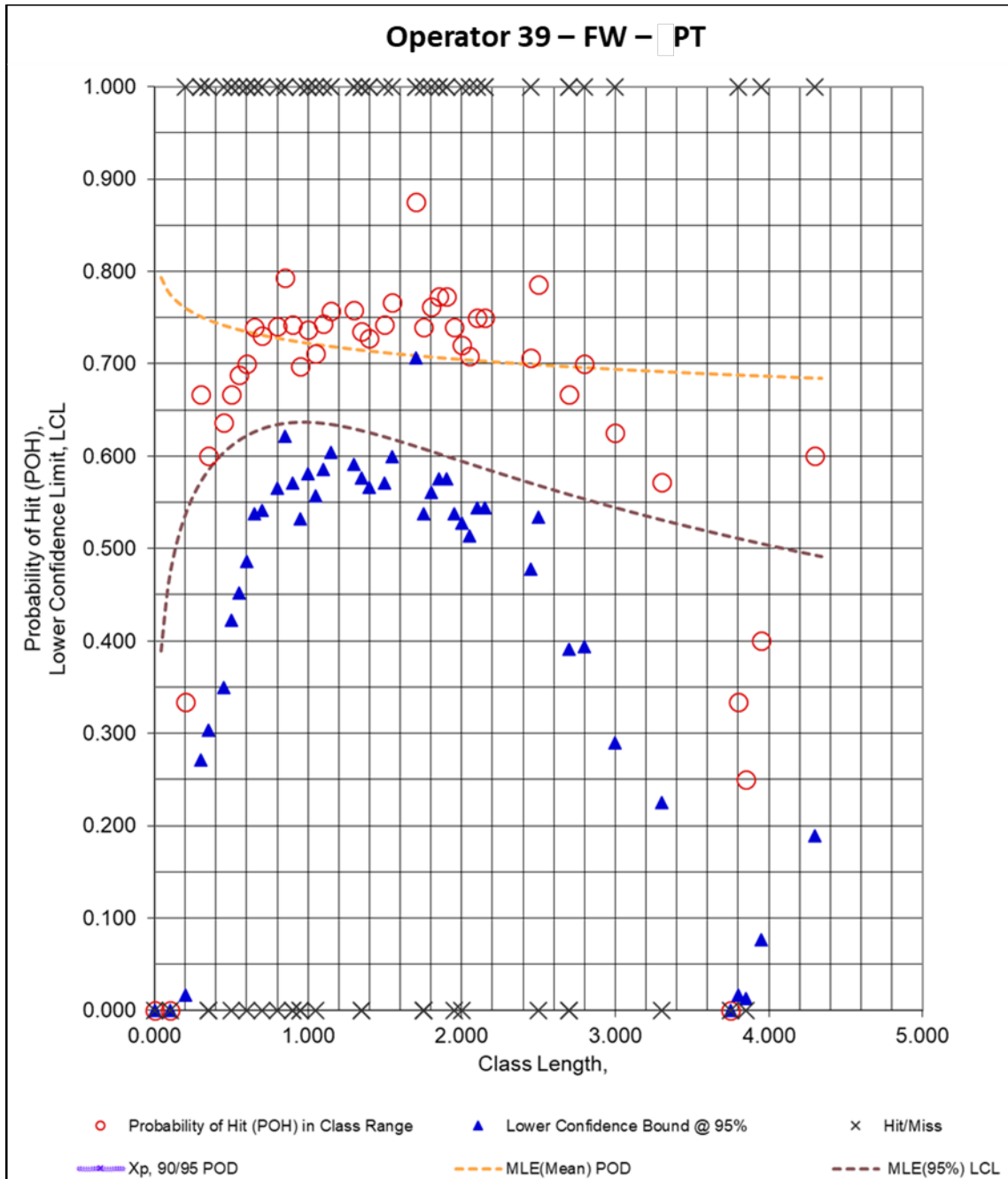


Figure 231. DOEPOD – FW – PT – Operator 39

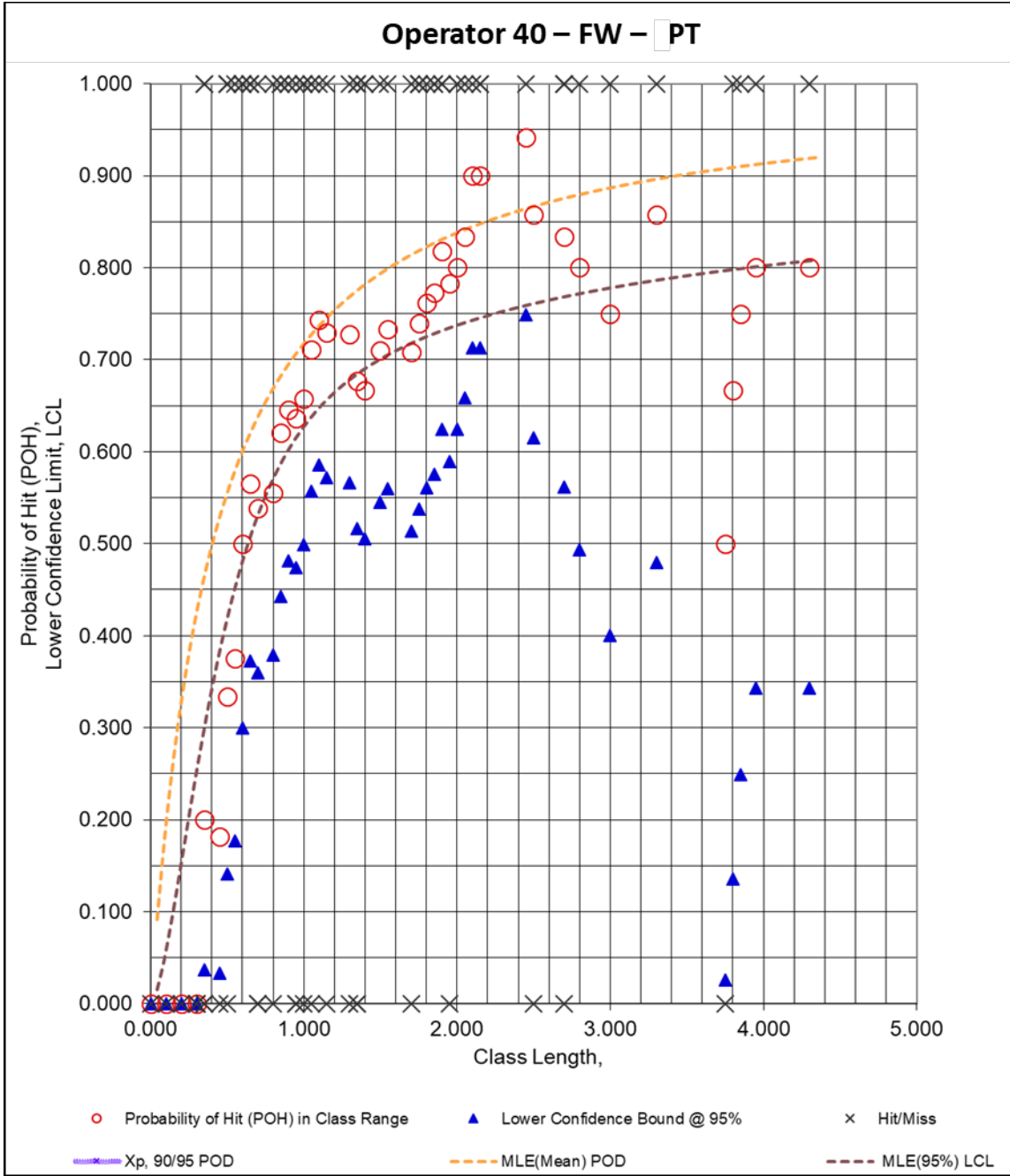


Figure 232. DOEPOD – FW – PT – Operator 40

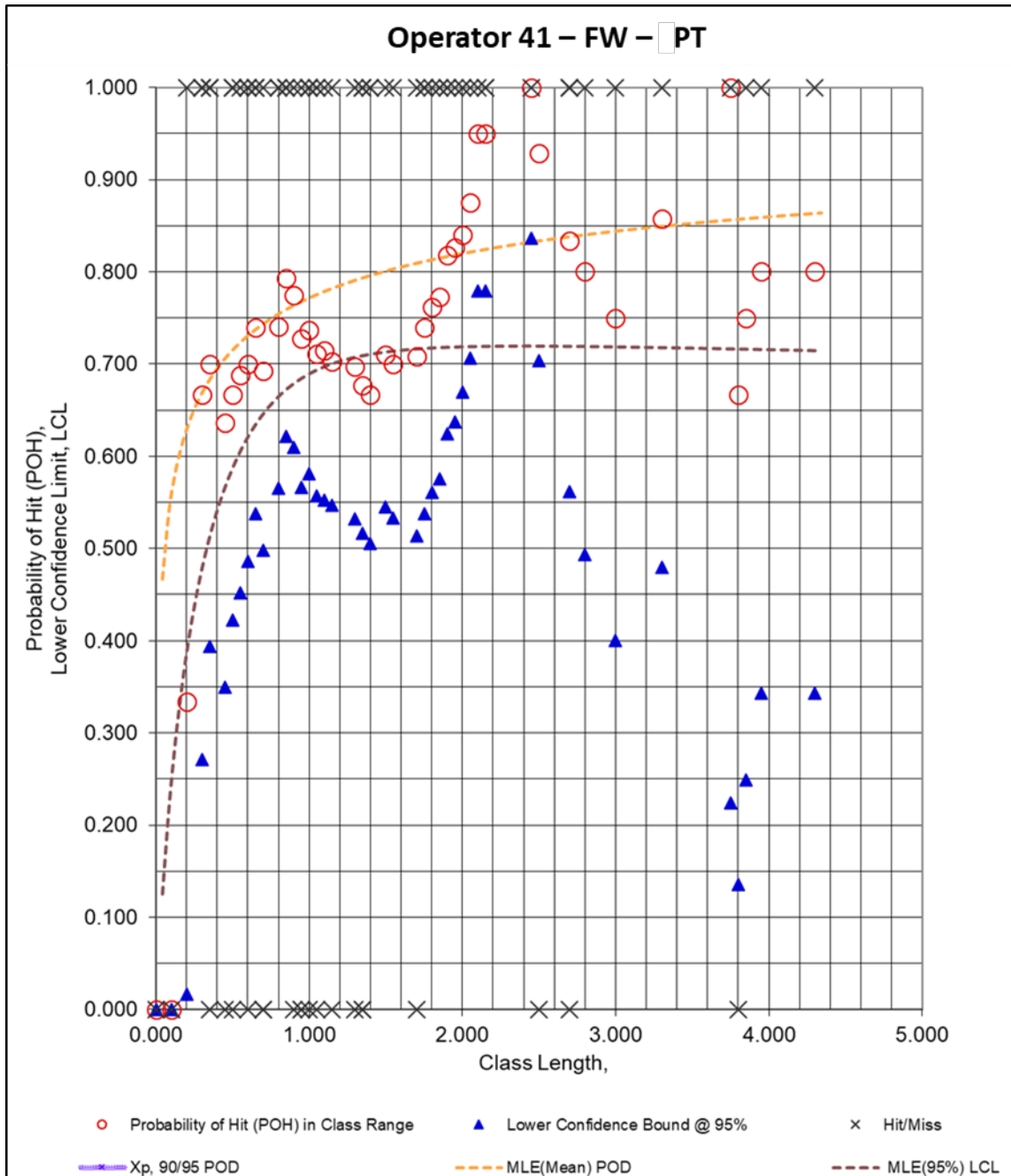


Figure 233. DOEPOD – FW – PT – Operator 41

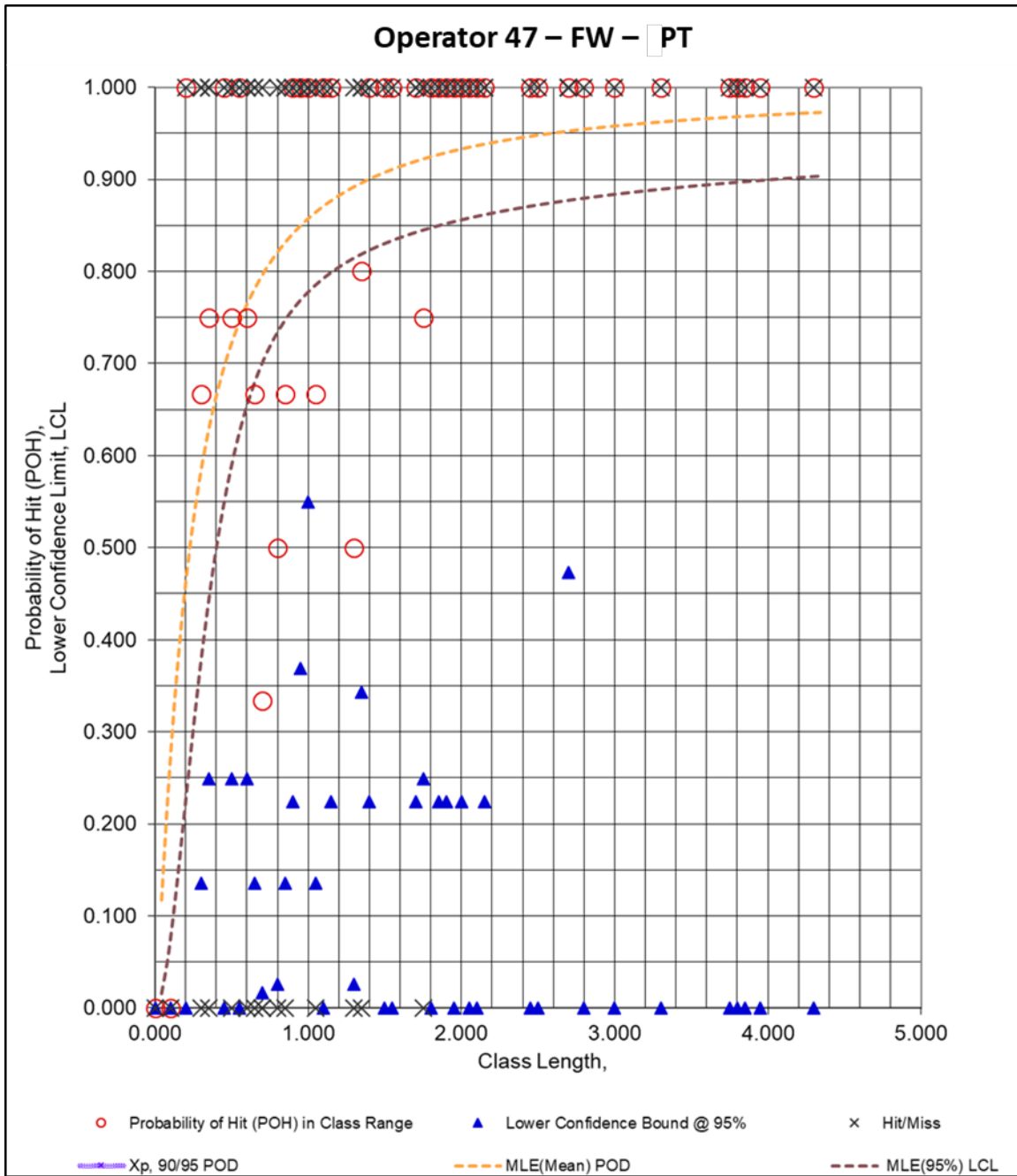


Figure 234. DOEPOD – FW – PT – Operator 47

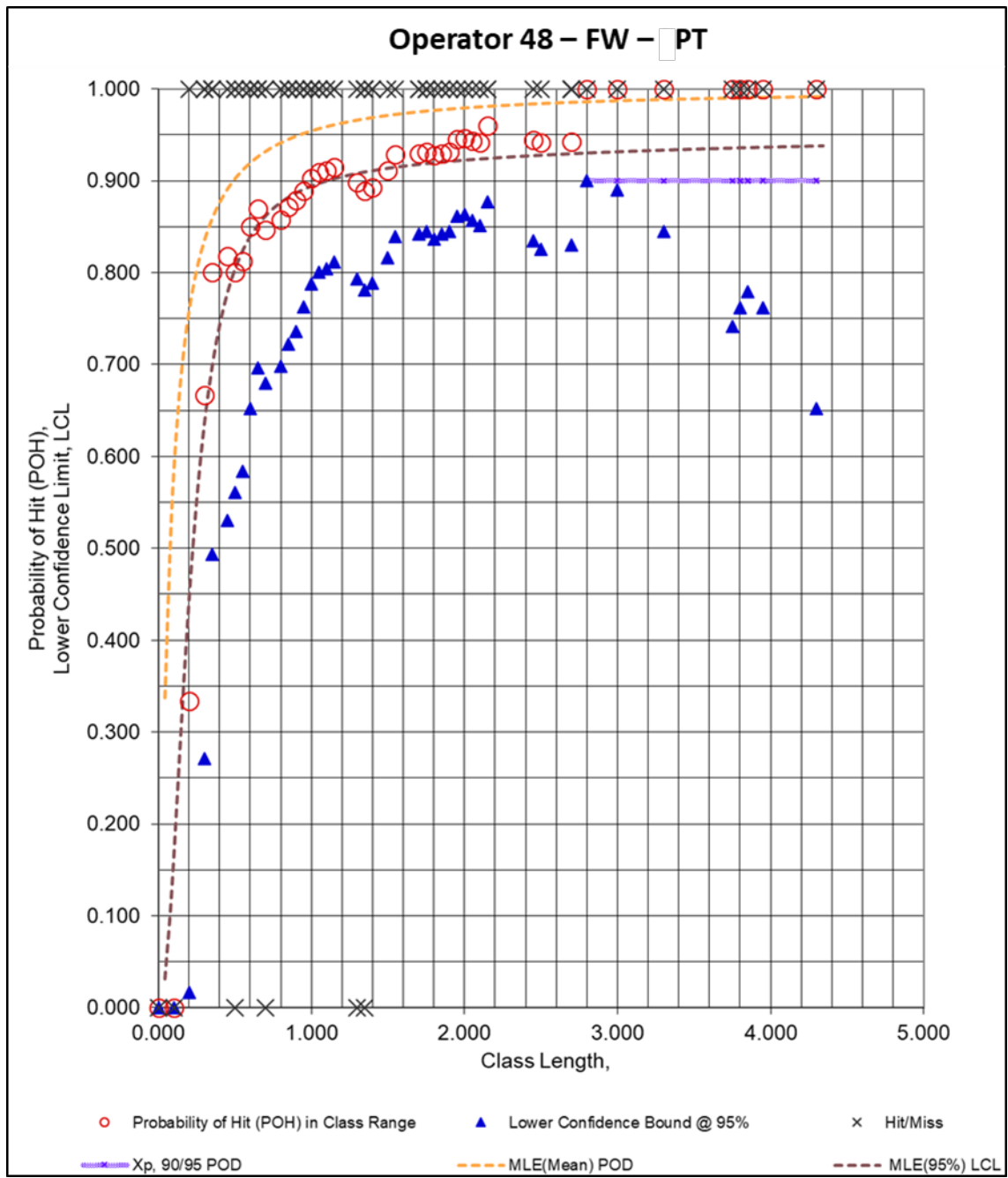


Figure 235. DOEPOD – FW – PT – Operator 48

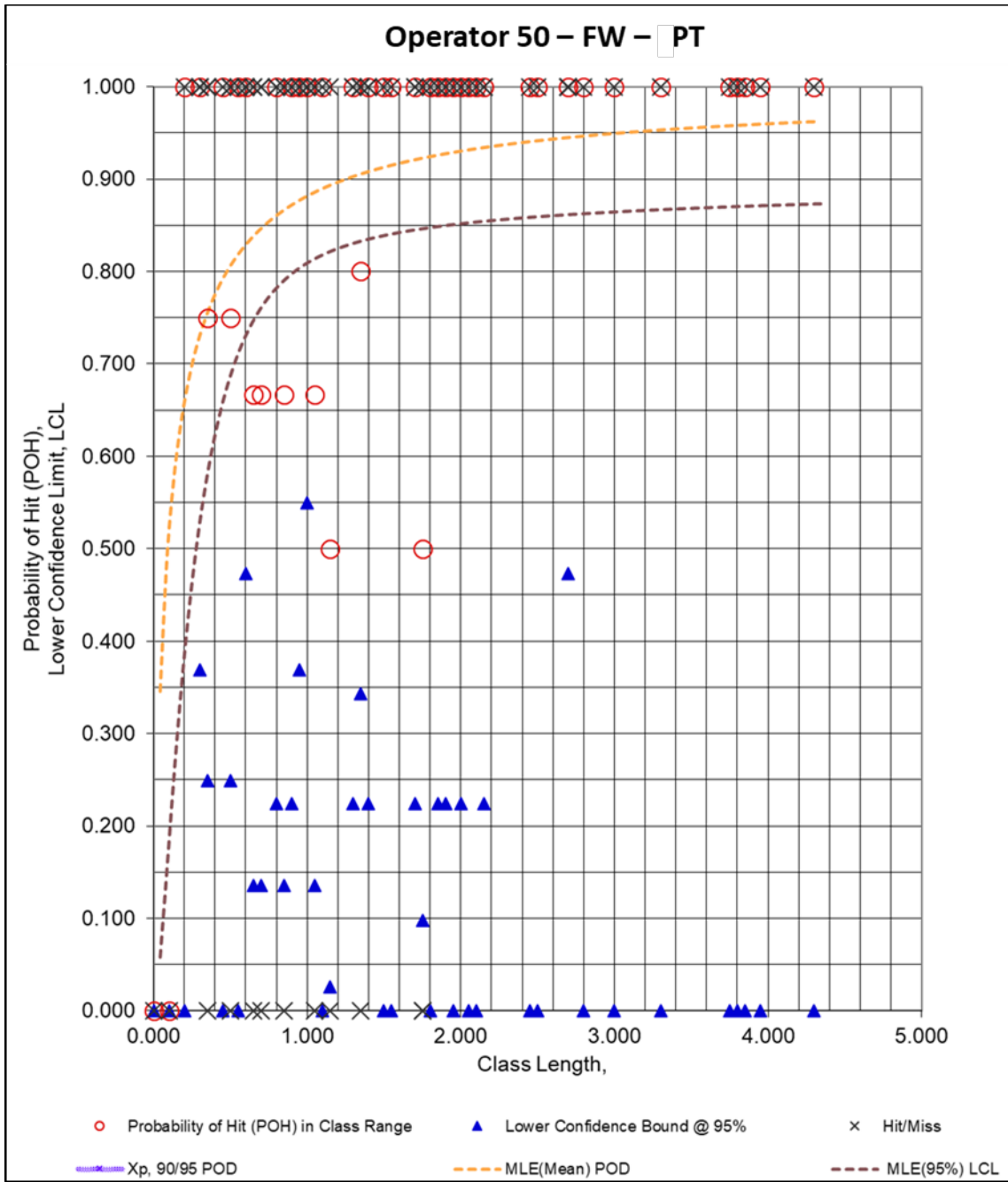


Figure 236. DOEPOD – FW – PT – Operator 50

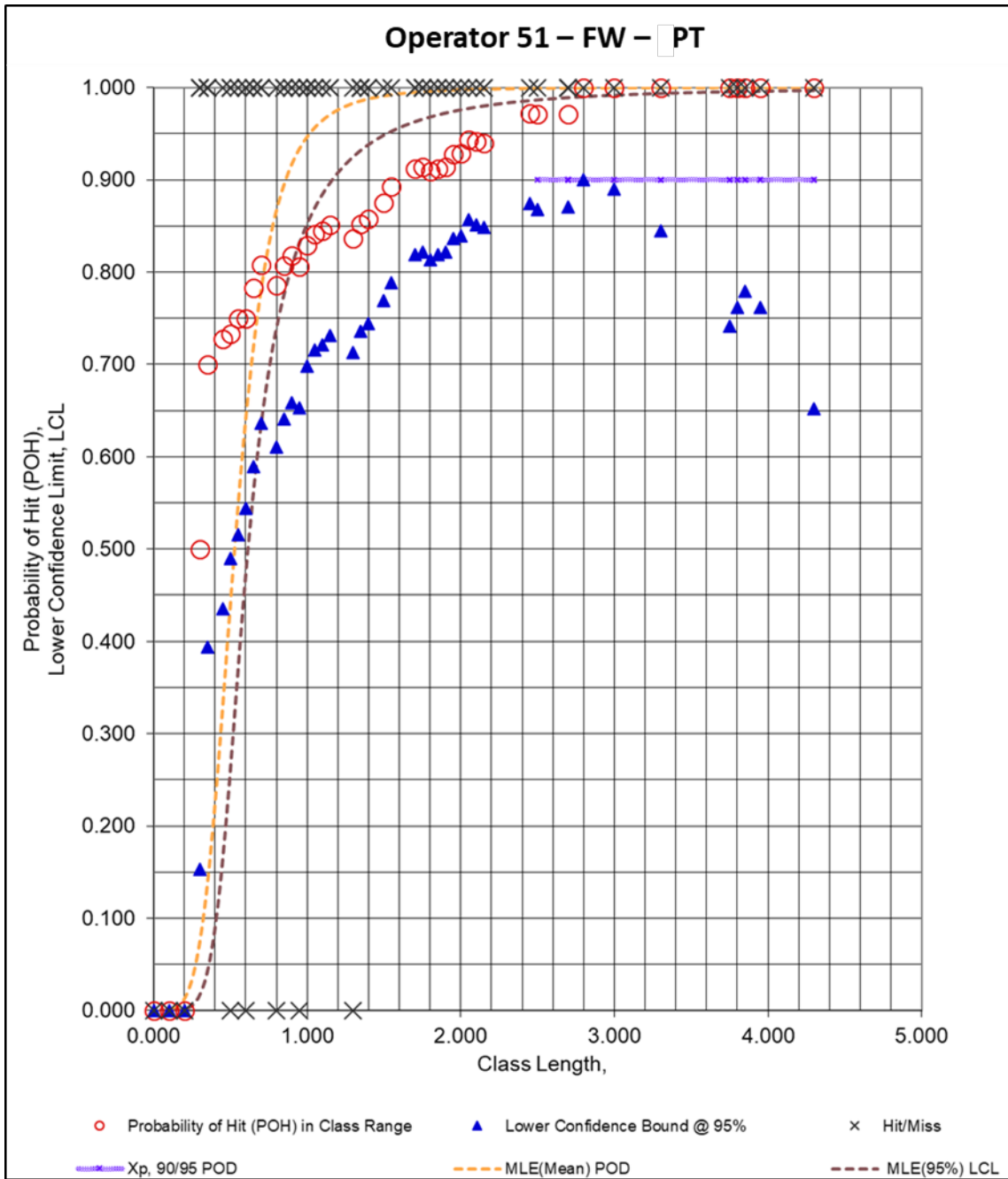


Figure 237. DOEPOD – FW – PT – Operator 51

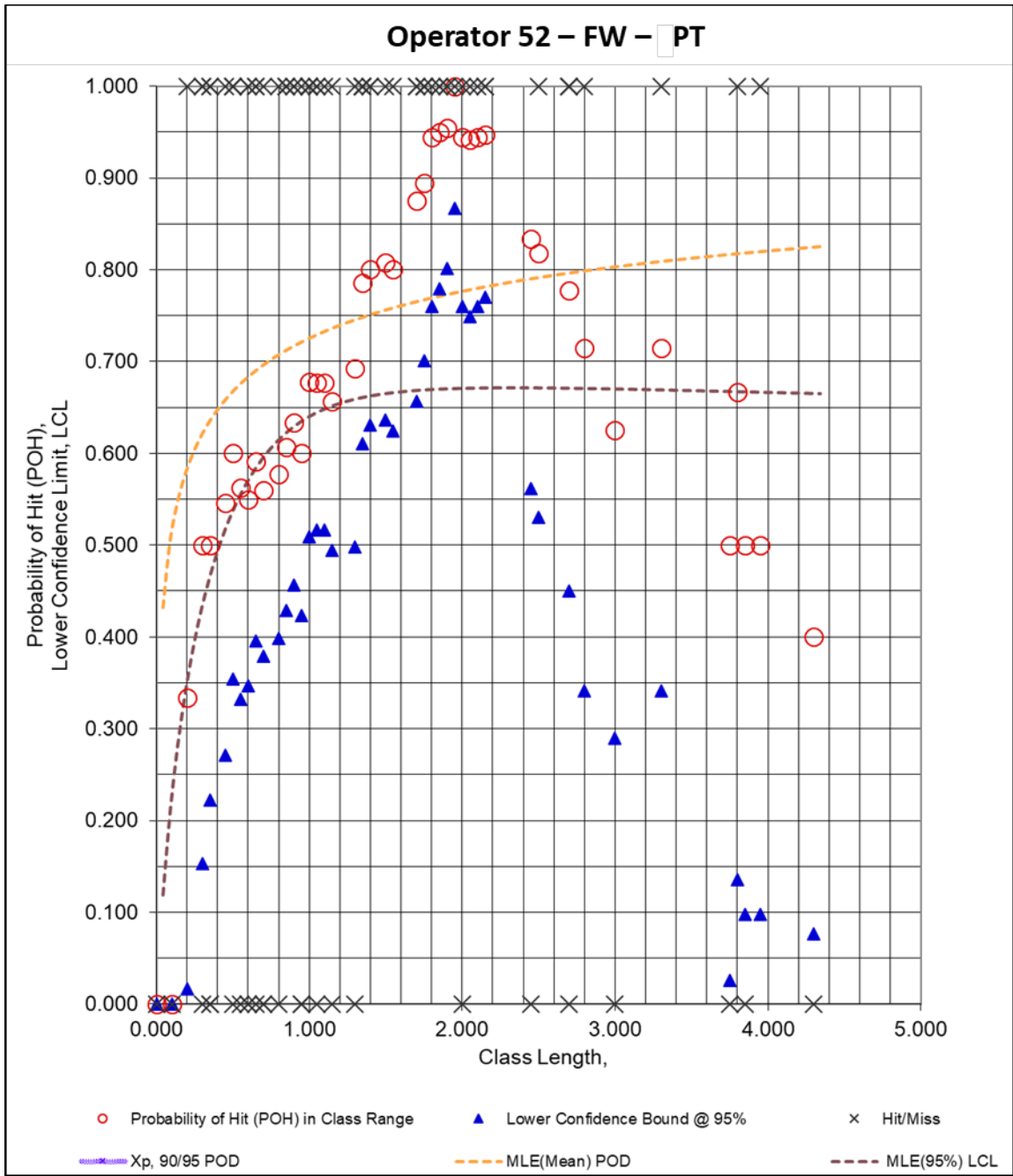


Figure 238. DOEPOD – FW – PT – Operator 52

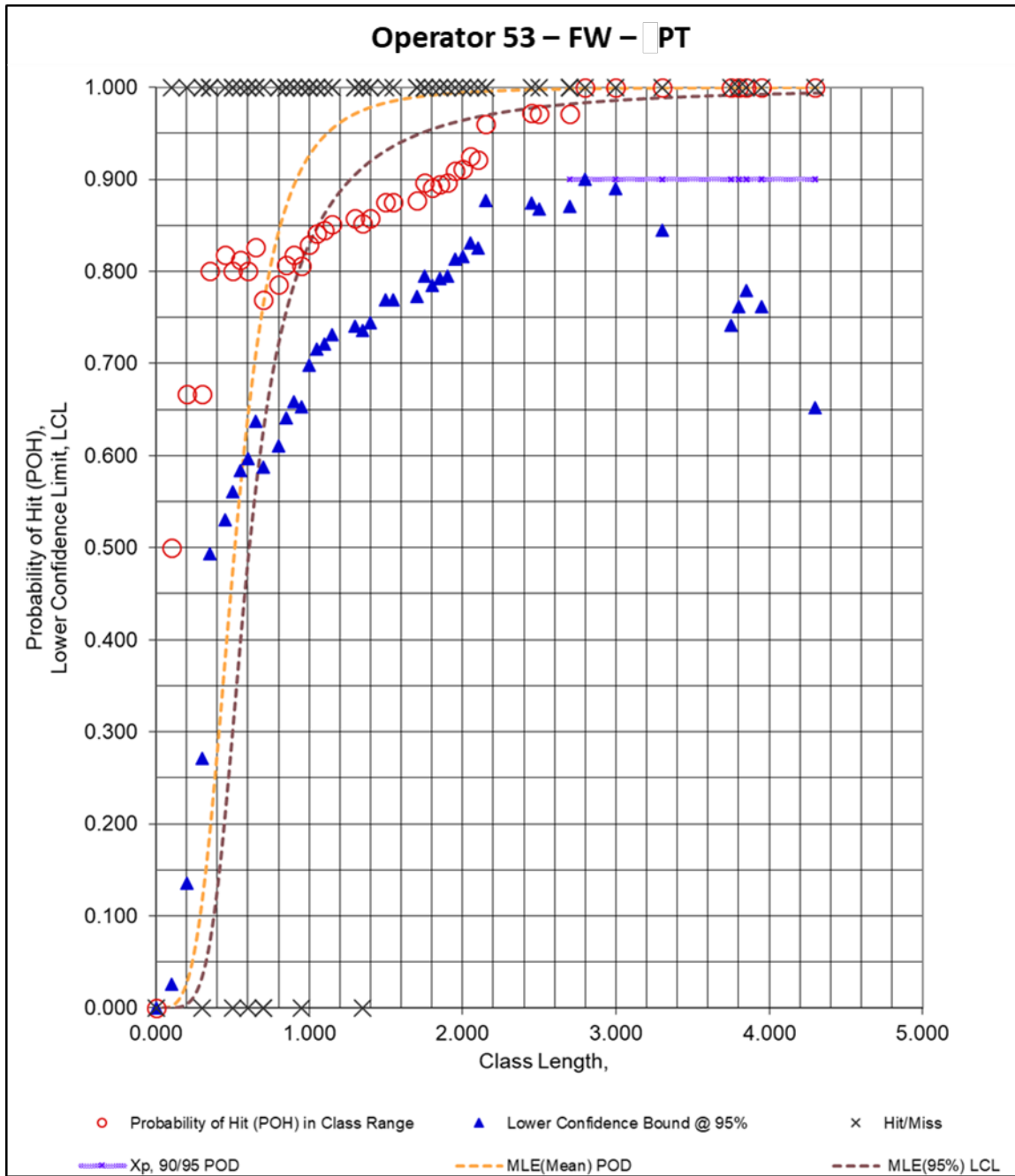


Figure 239. DOEPOD – FW – PT – Operator 53

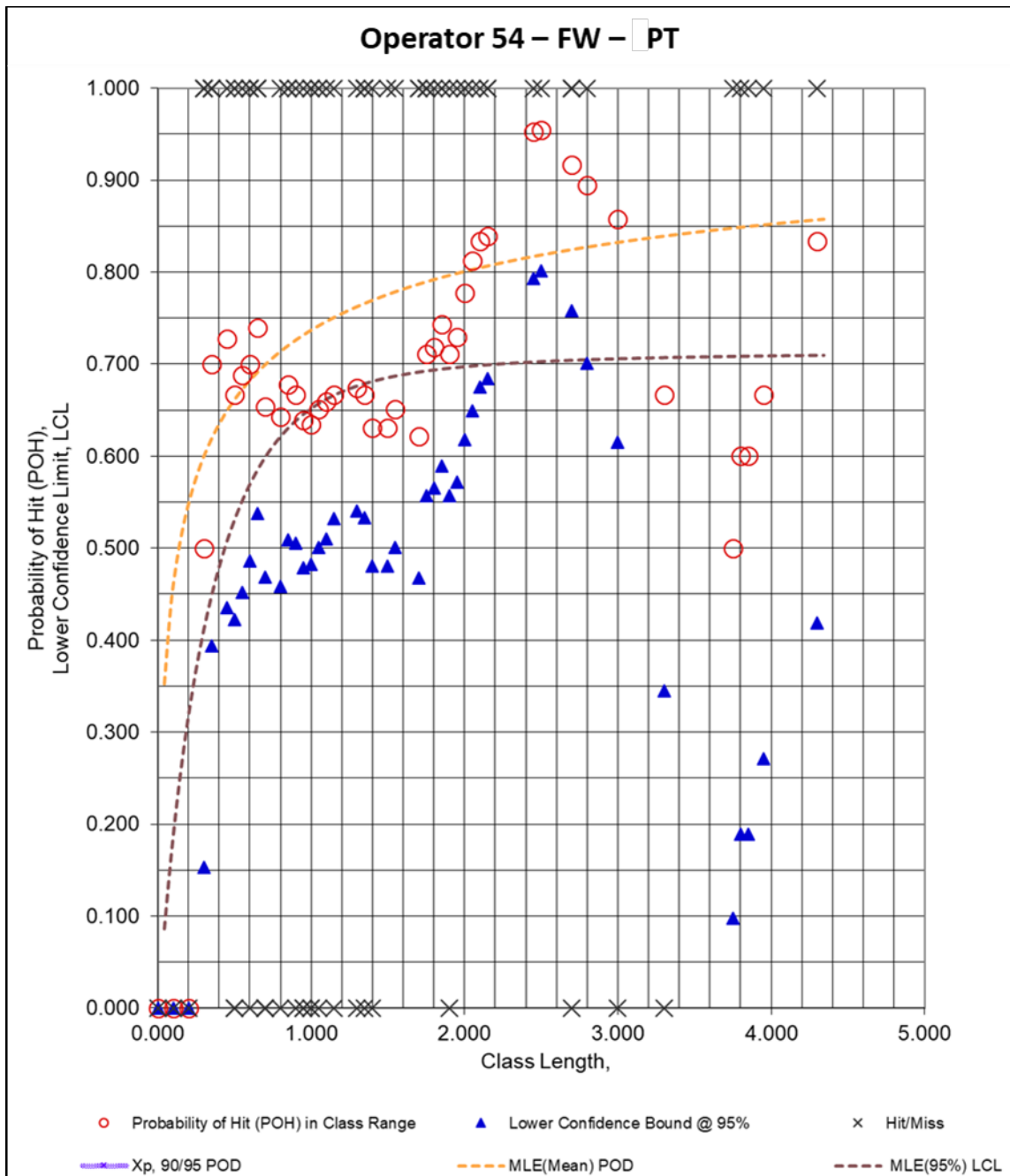


Figure 240. DOEPOD – FW – PT – Operator 54

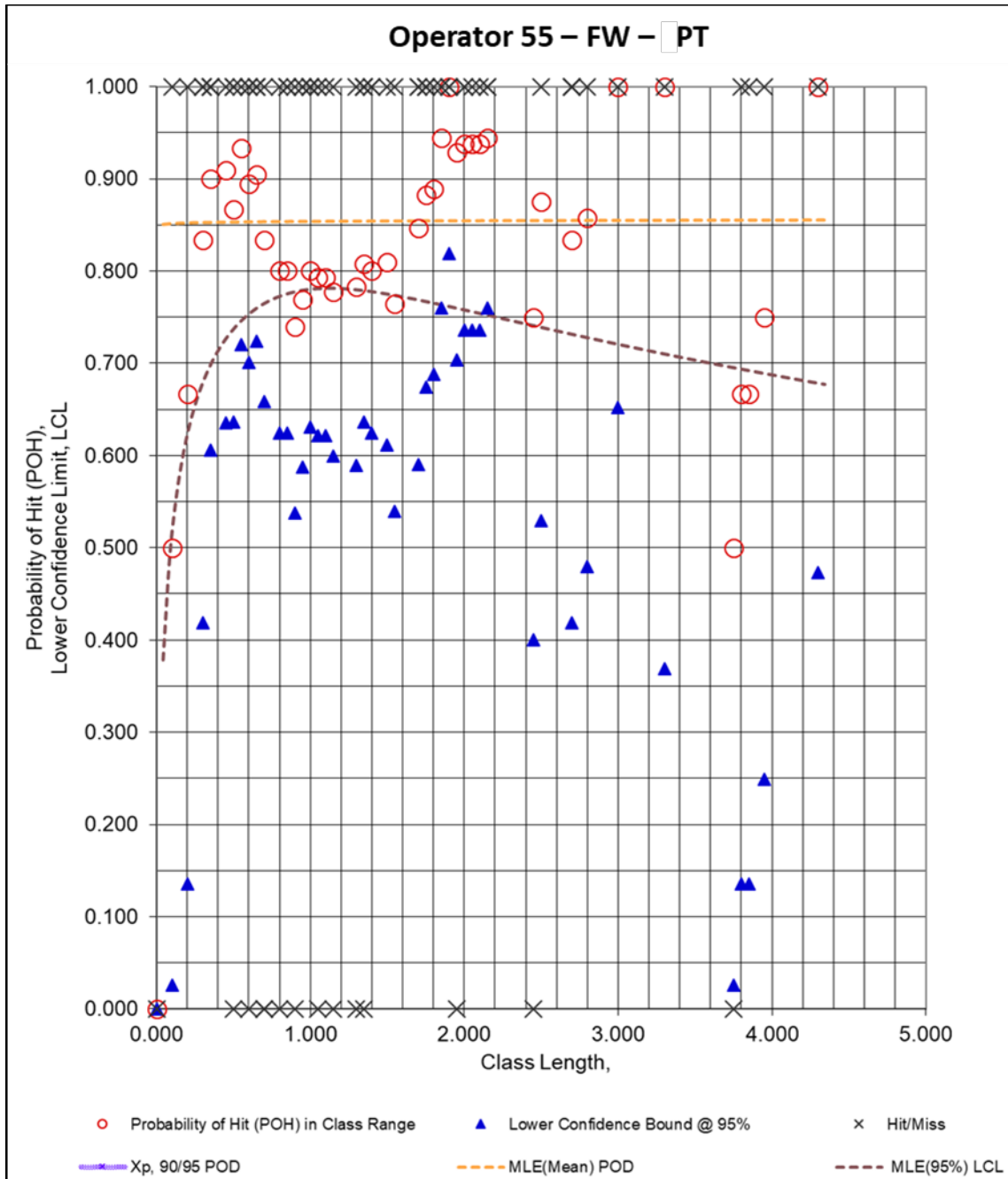


Figure 241. DOEPOD – FW – PT – Operator 55

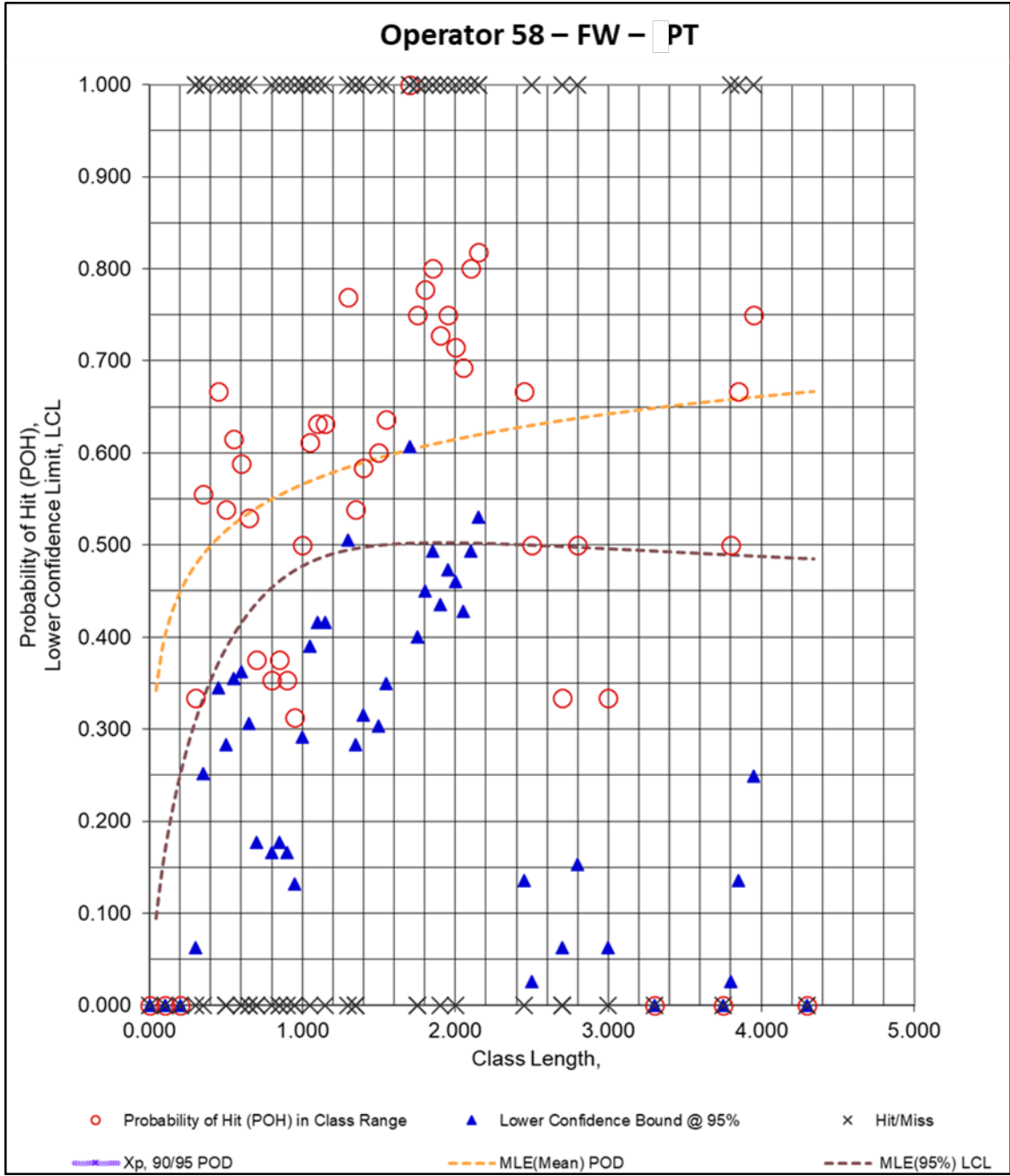


Figure 242. DOEPOD – FW – PT – Operator 58

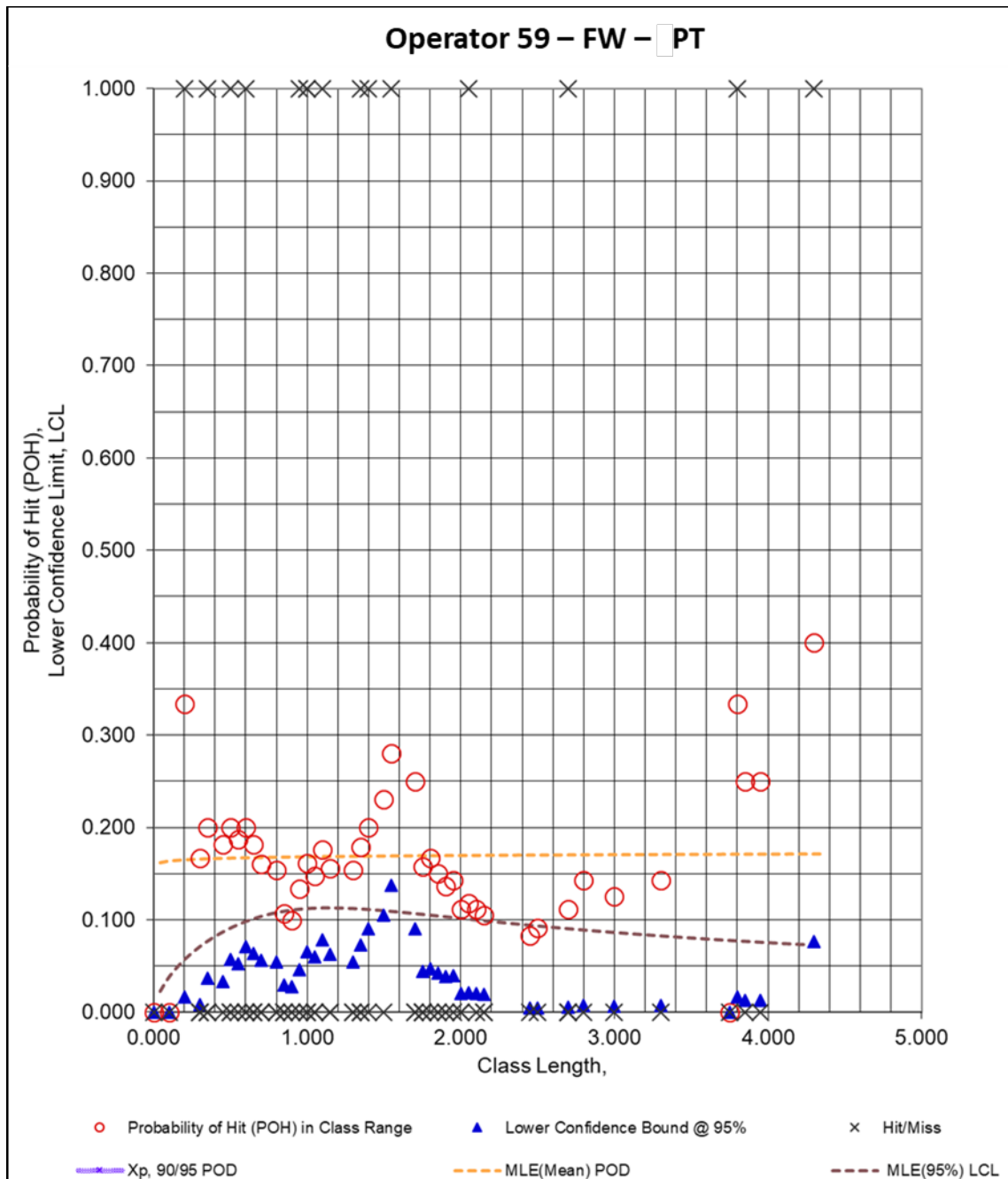


Figure 243. DOEPOD – FW – PT – Operator 59

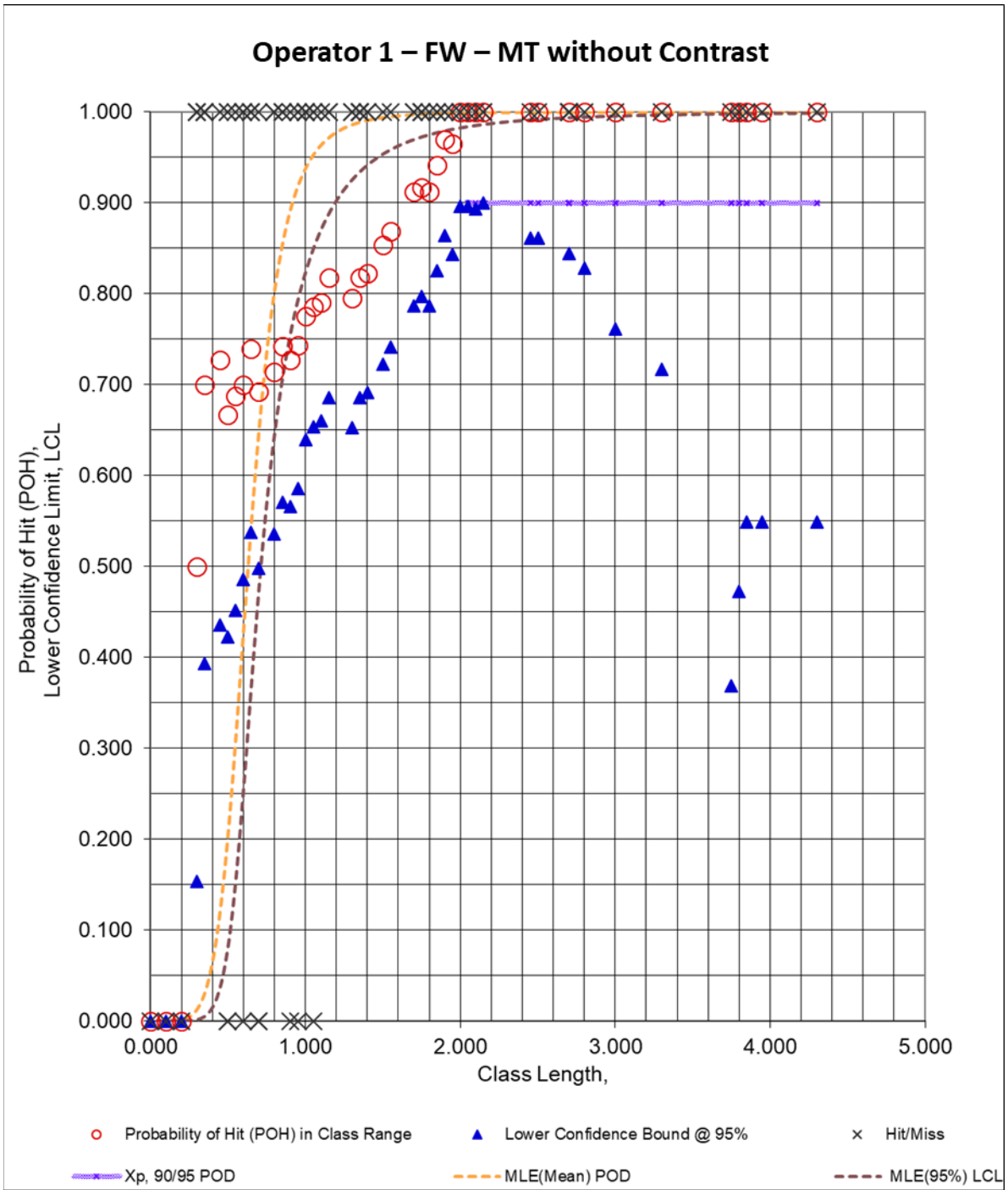


Figure 244. DOEPOD – FW – MT without Contrast – Operator 1

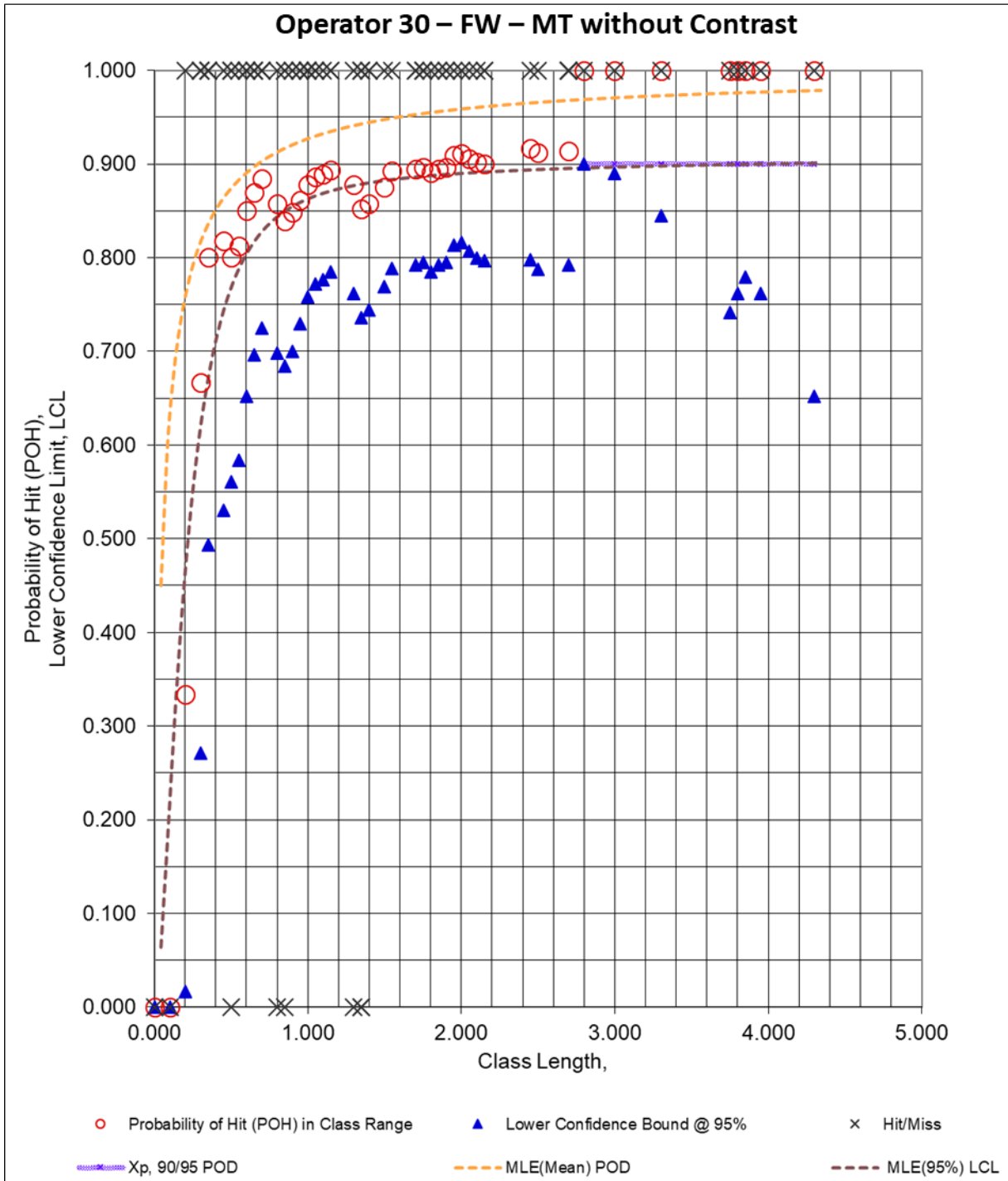


Figure 245. DOEPOD – FW – MT without Contrast – Operator 30

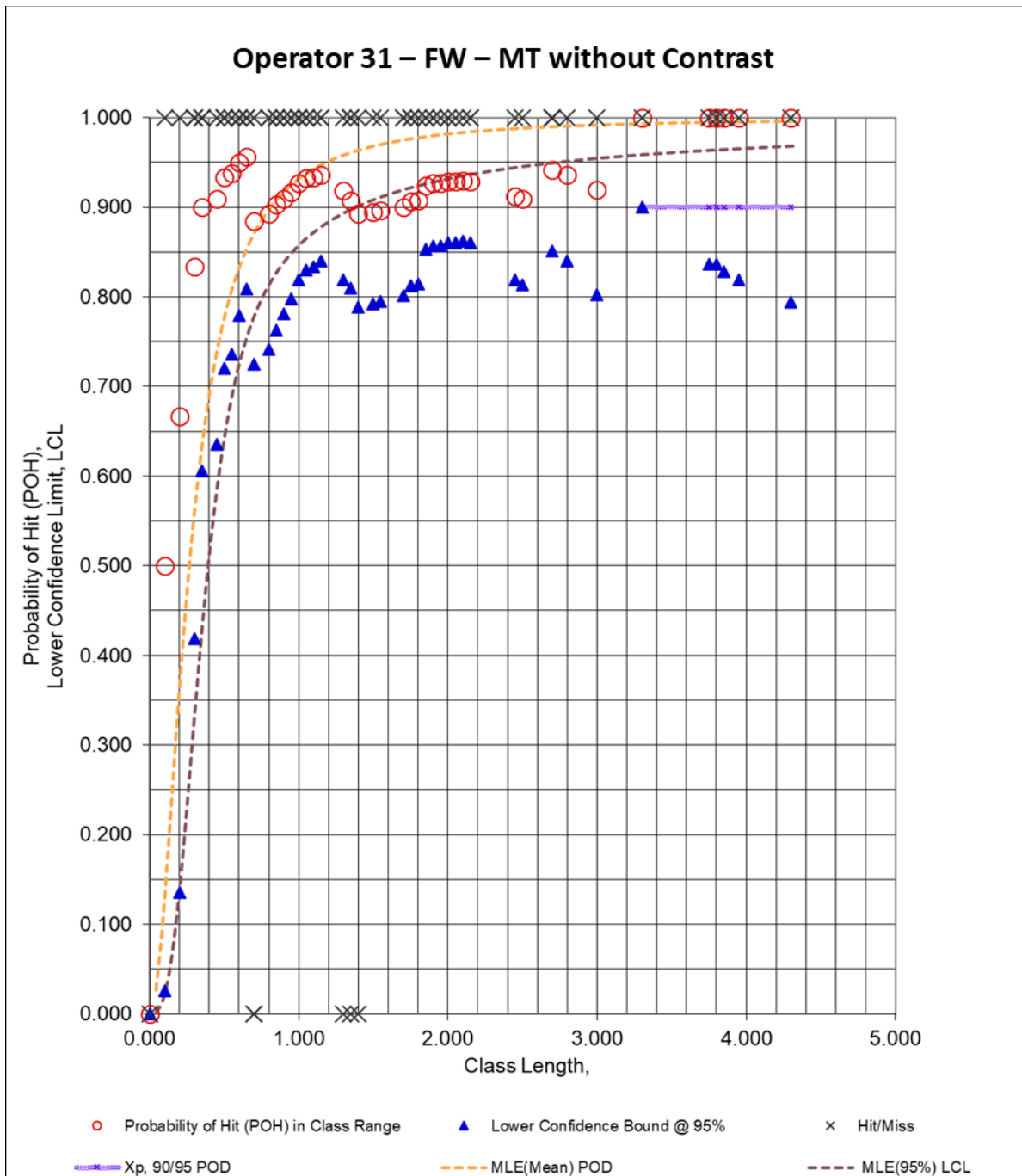


Figure 246. DOEPOD – FW – MT without Contrast – Operator 31

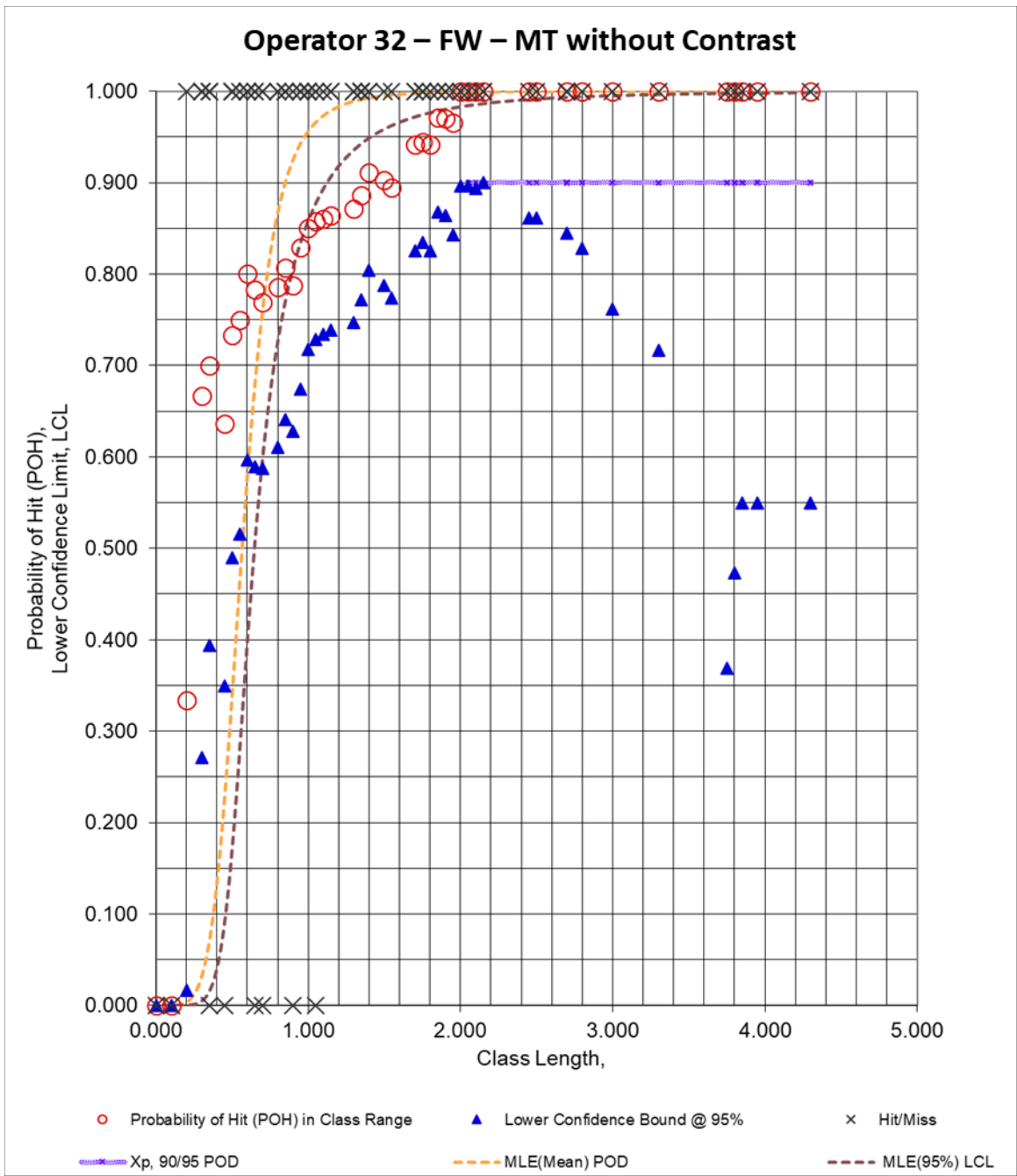


Figure 247. DOEPOD – FW – MT without Contrast – Operator 32

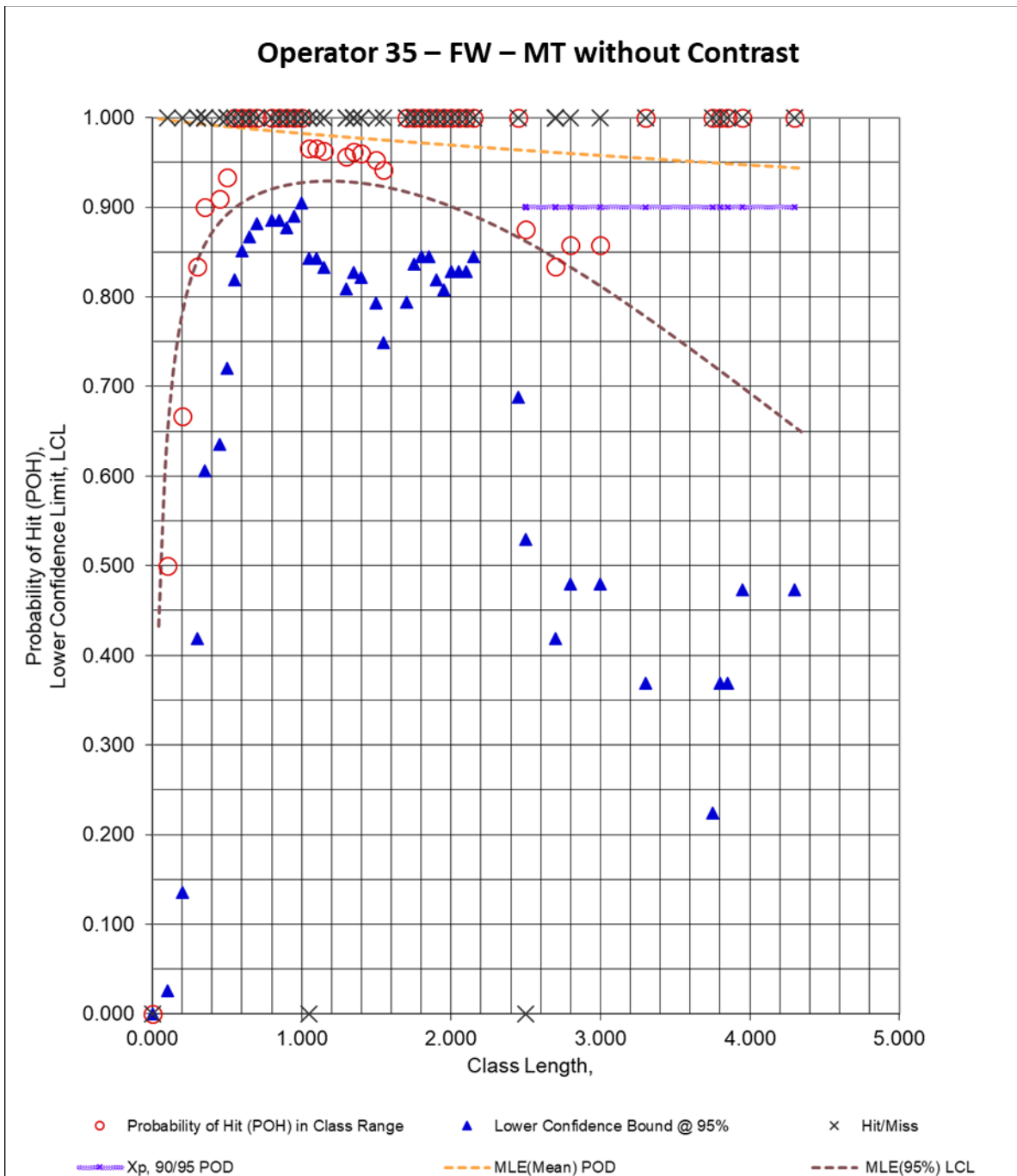


Figure 248. DOEPOD – FW – MT without Contrast – Operator 35

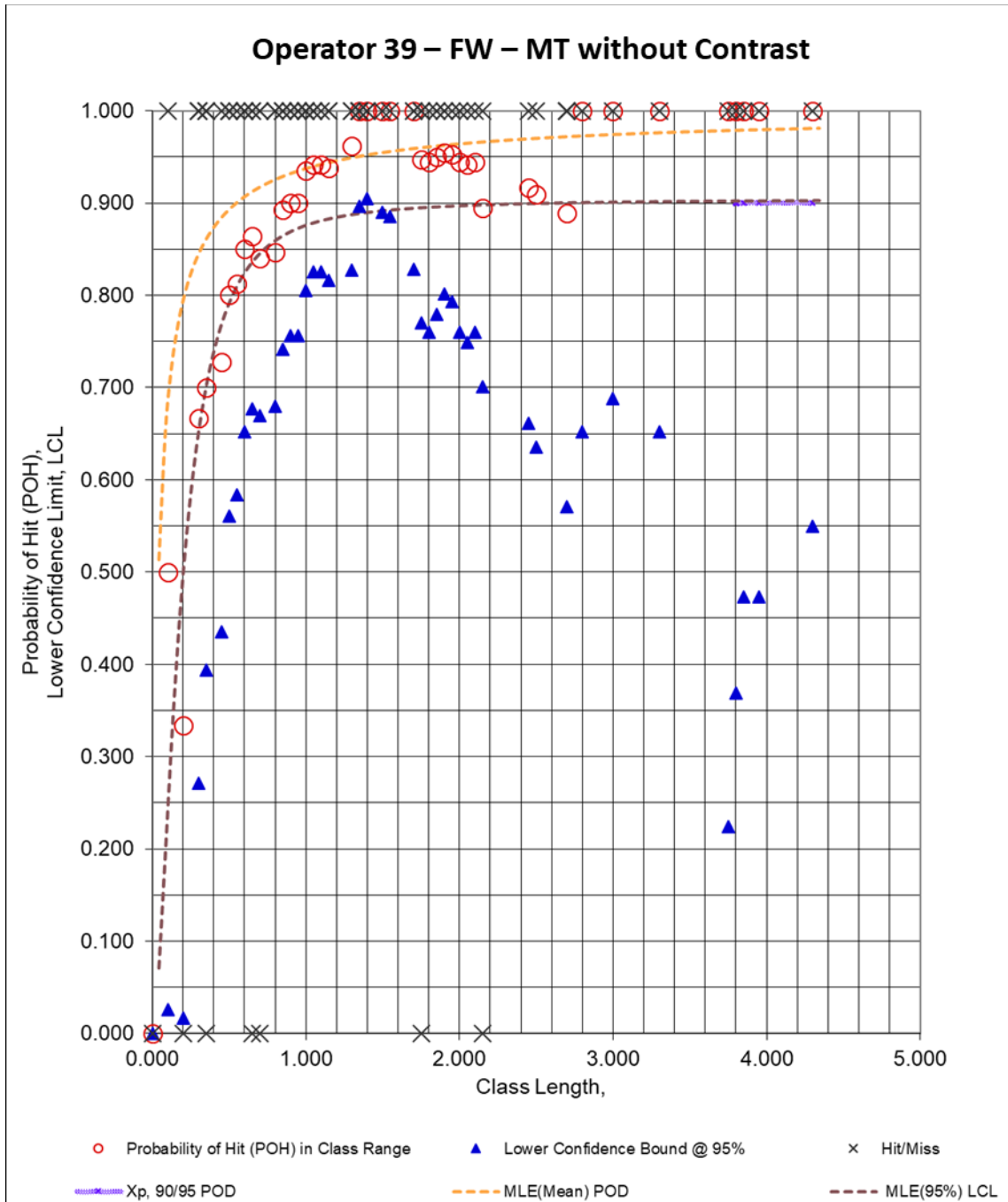


Figure 249. DOEPOD – FW – MT without Contrast – Operator 39

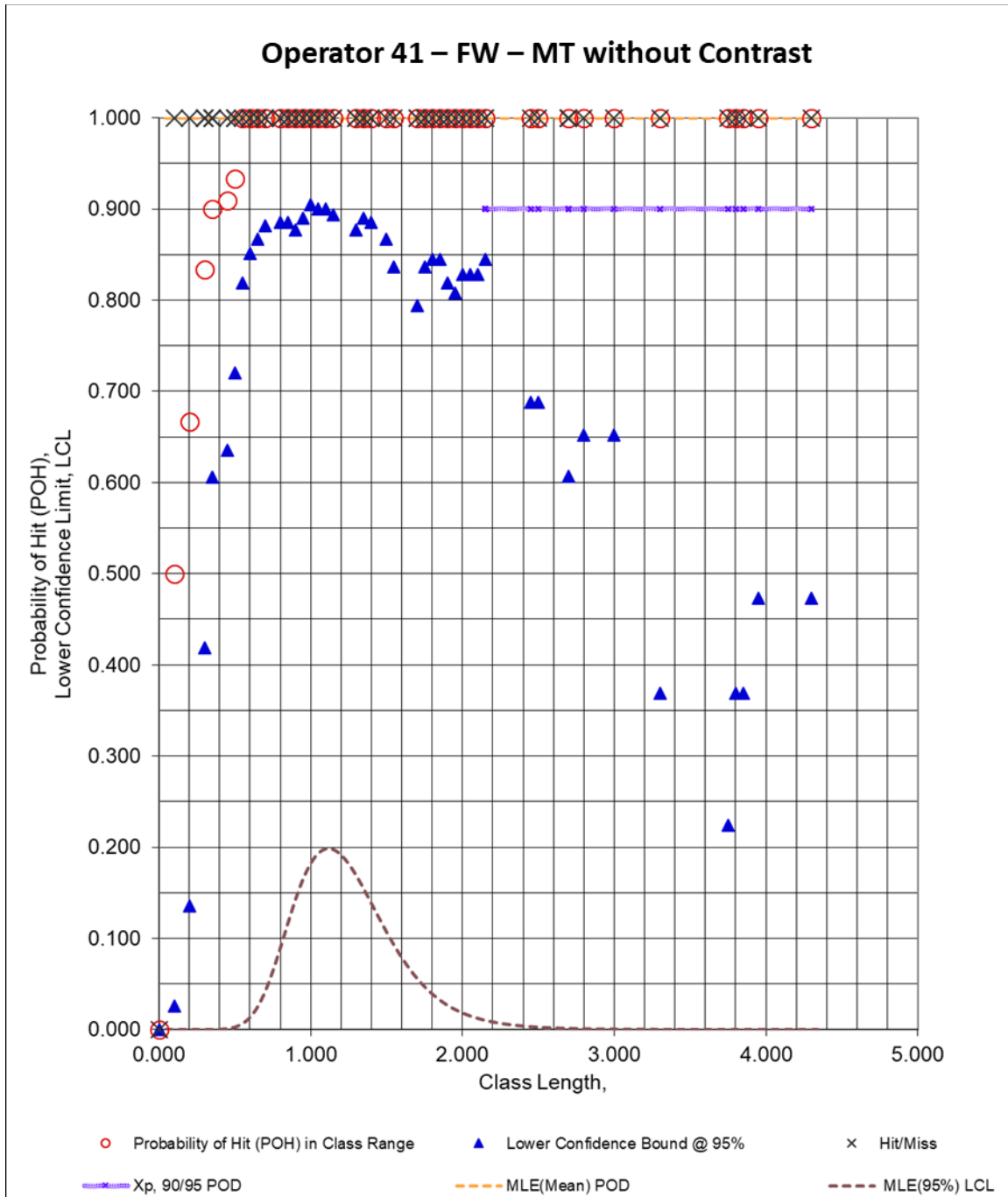


Figure 250. DOEPOD – FW – MT without Contrast – Operator 41

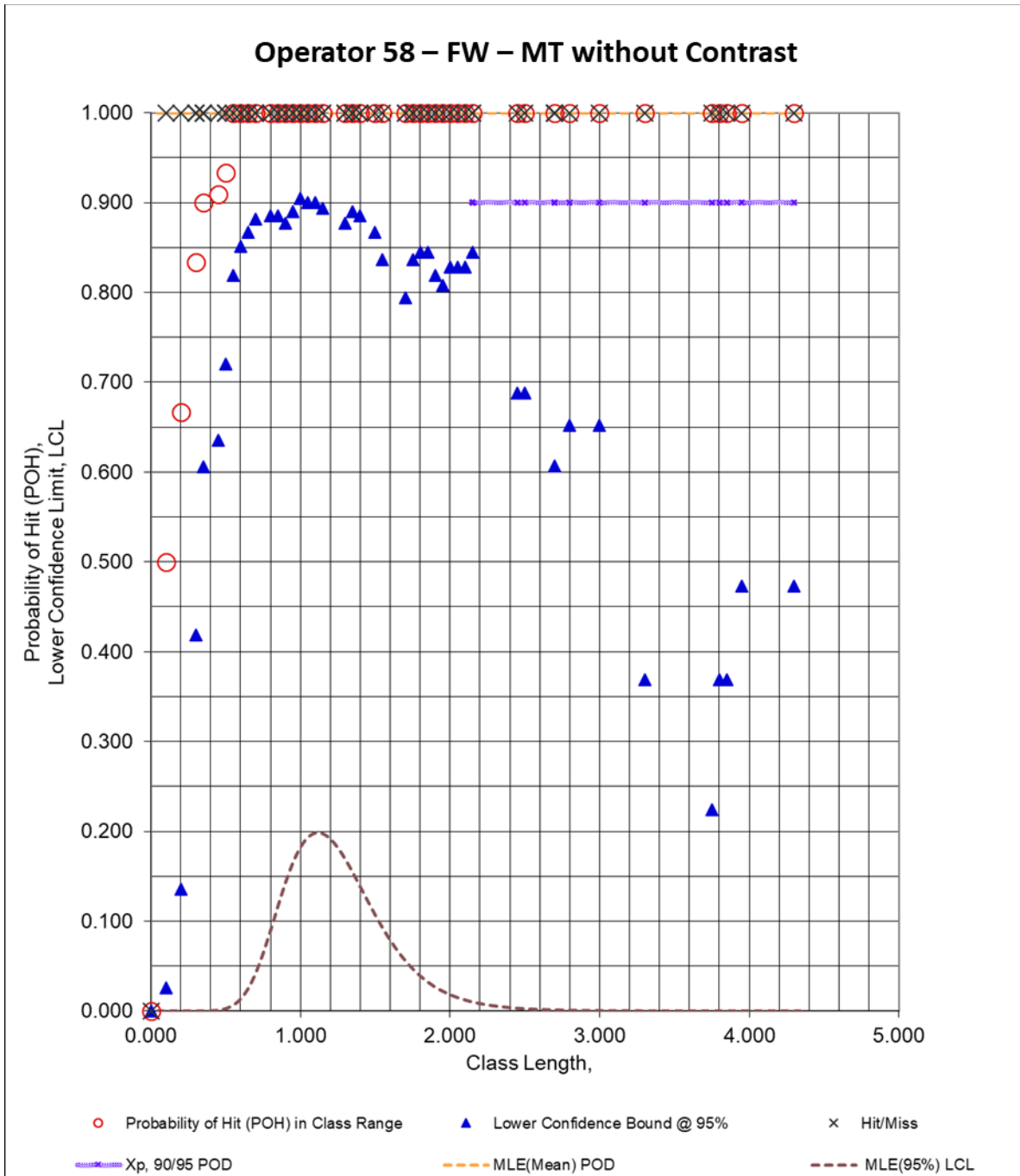


Figure 251. DOEPOD – FW – MT without Contrast – Operator 58

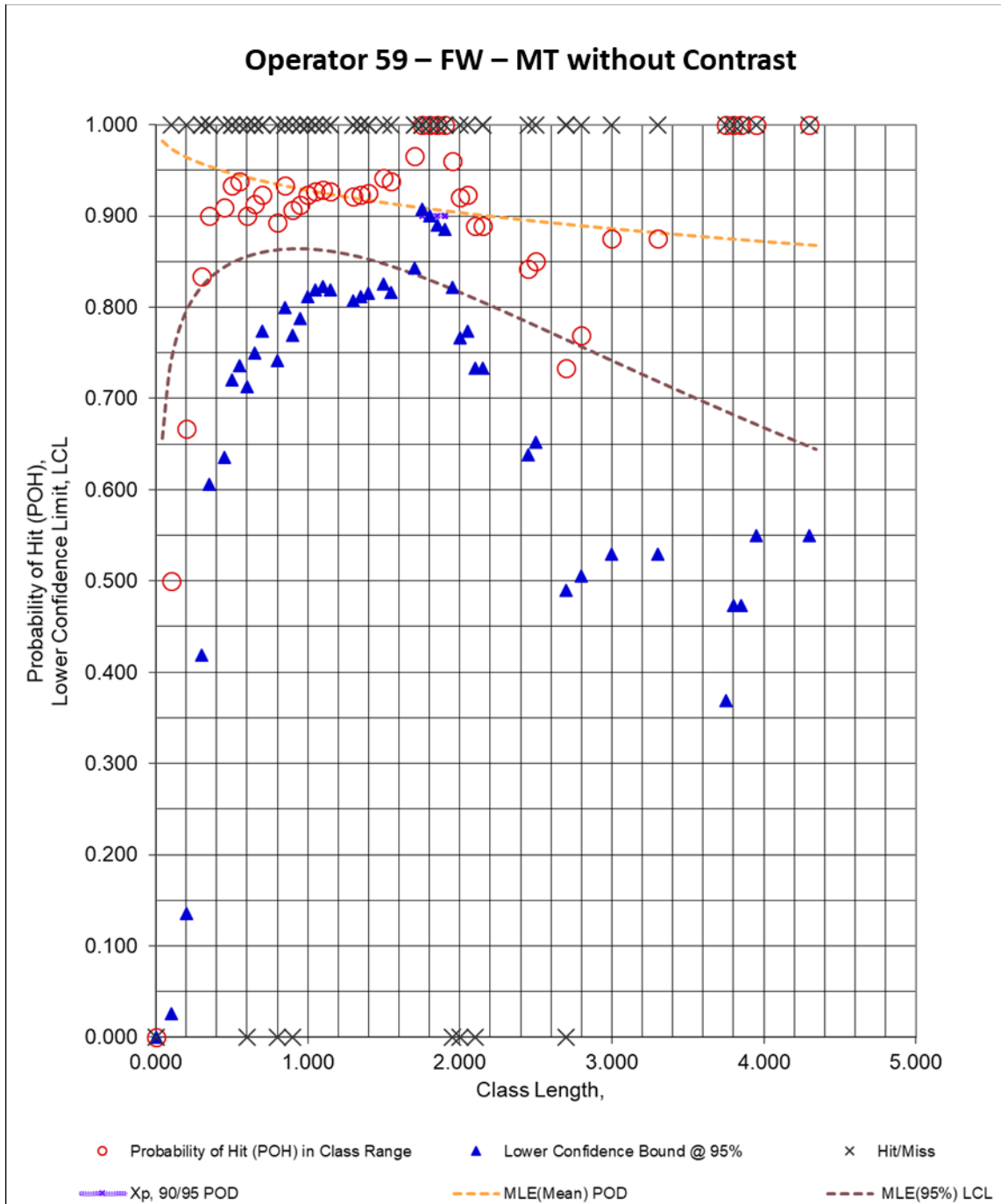


Figure 252. DOEPOD – FW – MT without Contrast – Operator 59

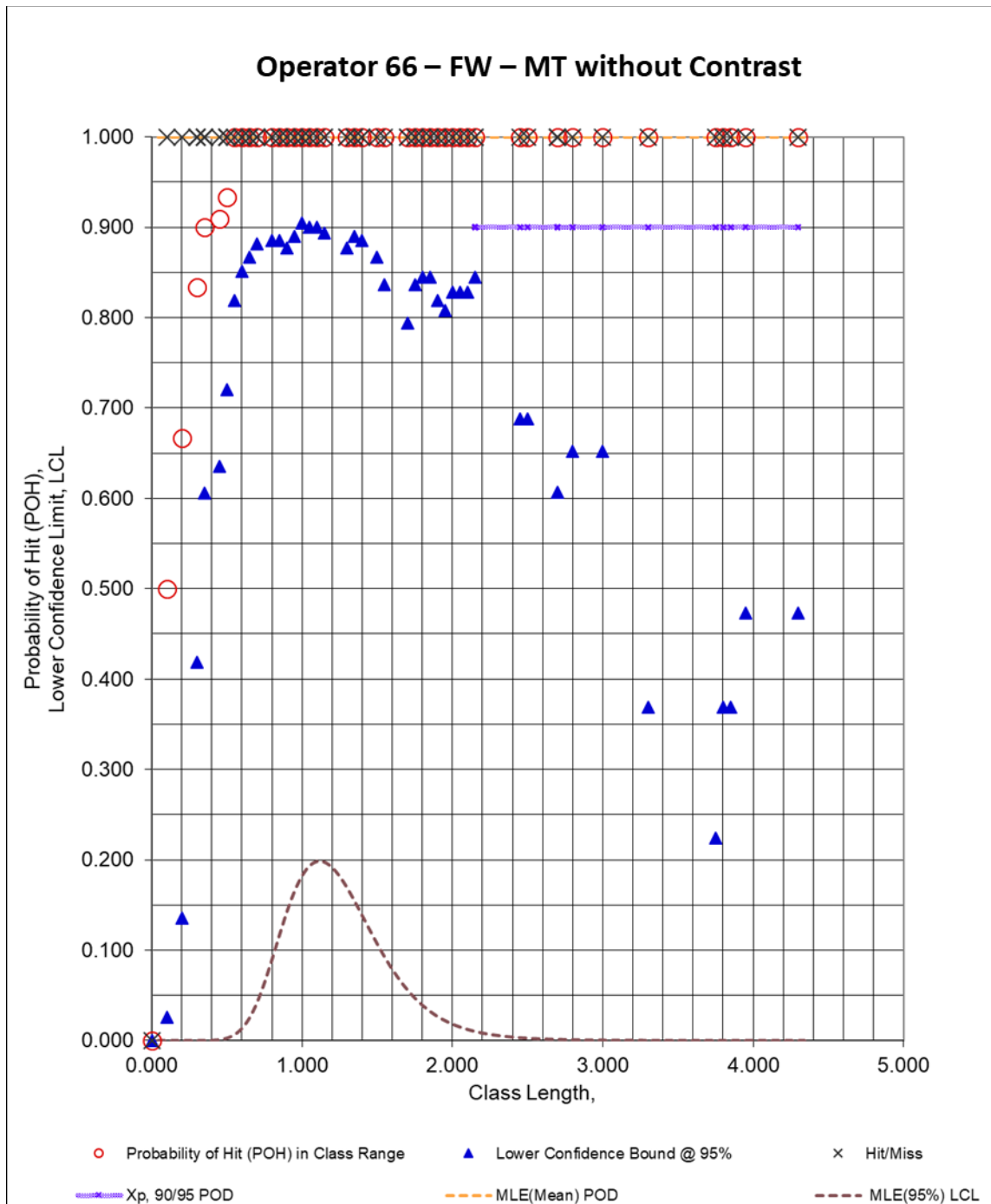


Figure 253. DOEPOD – FW – MT without Contrast – Operator 66

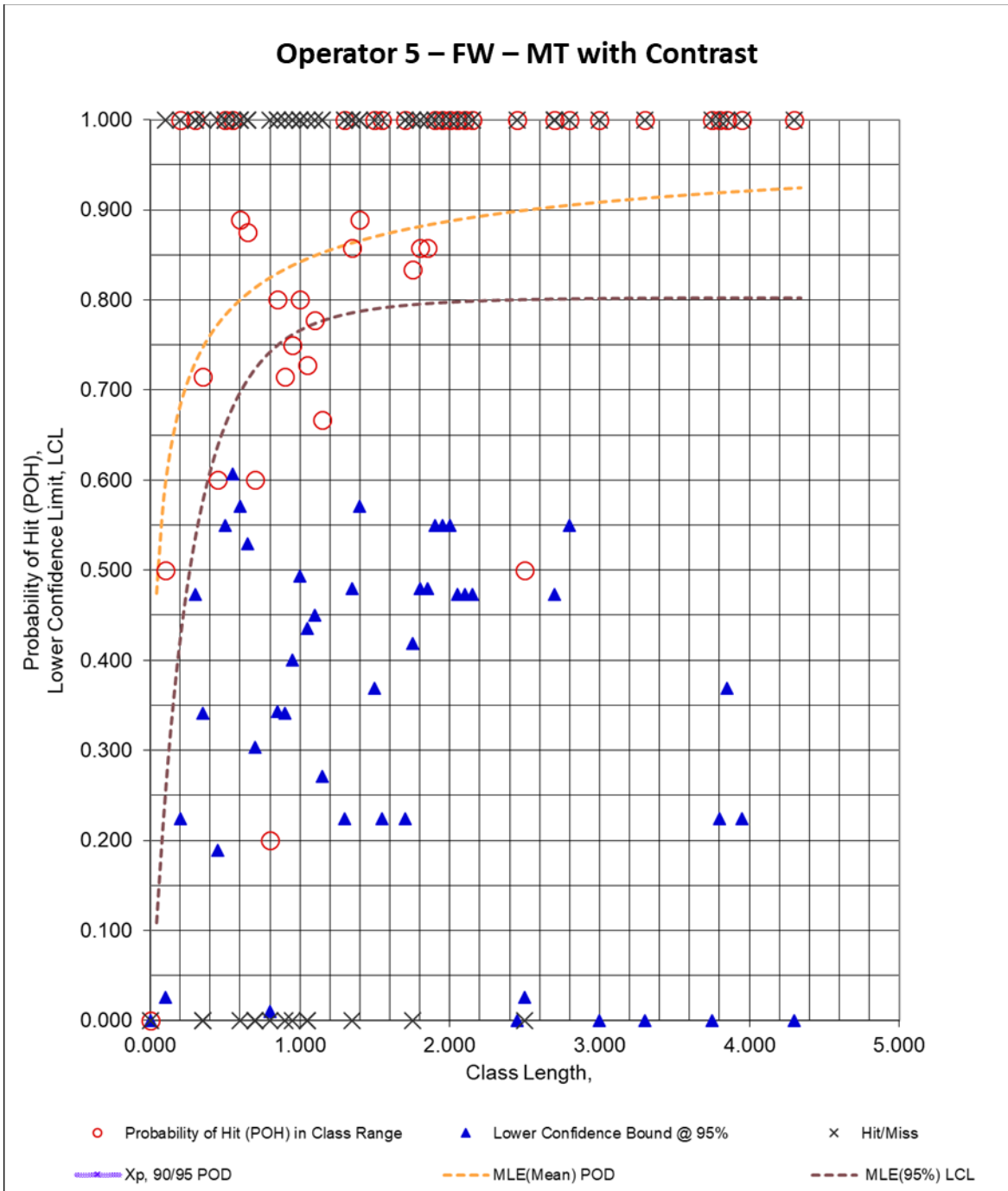


Figure 254. DOEPOD – FW – MT with Contrast – Operator 5

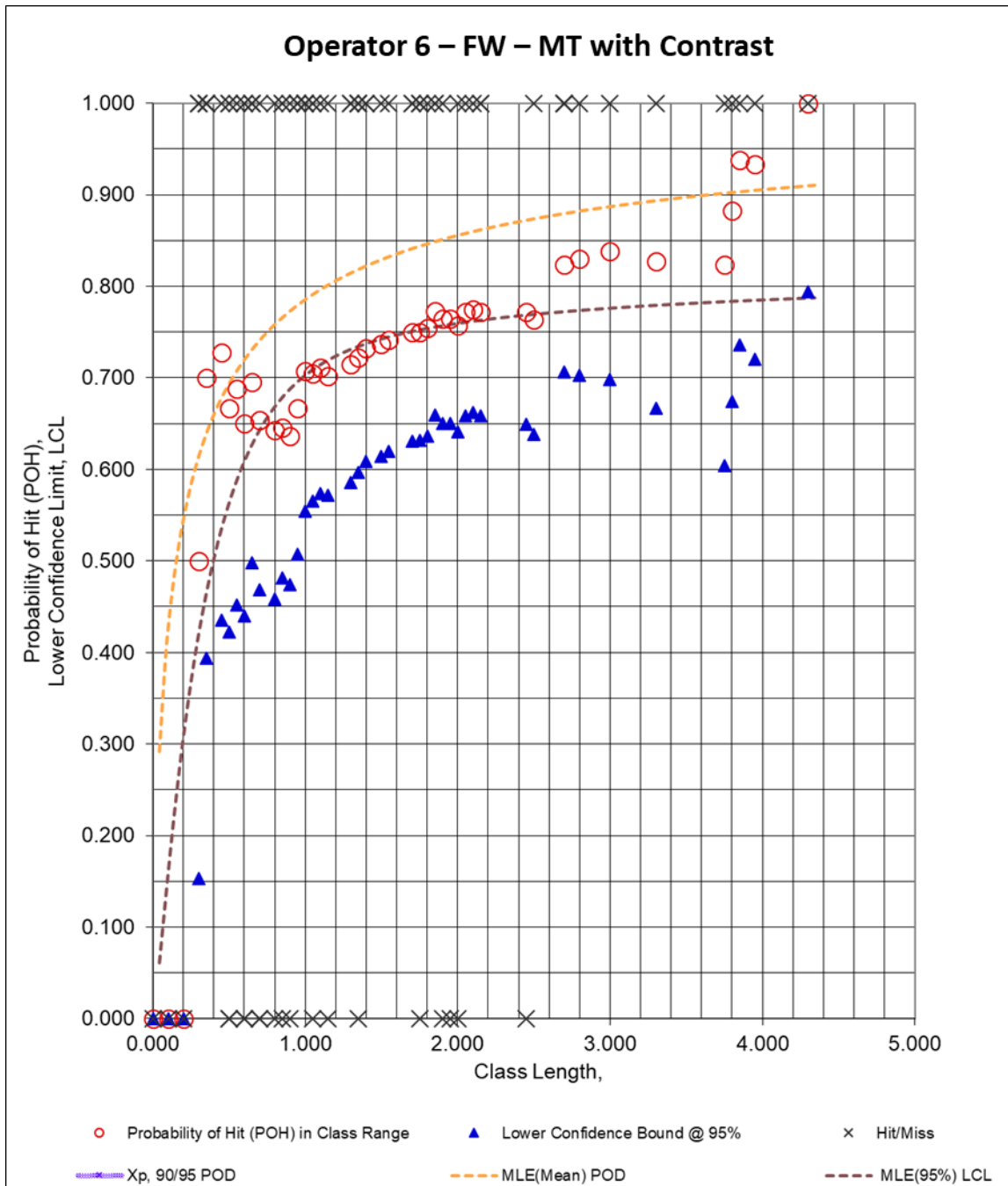


Figure 255. DOEPOD – FW – MT with Contrast – Operator 6

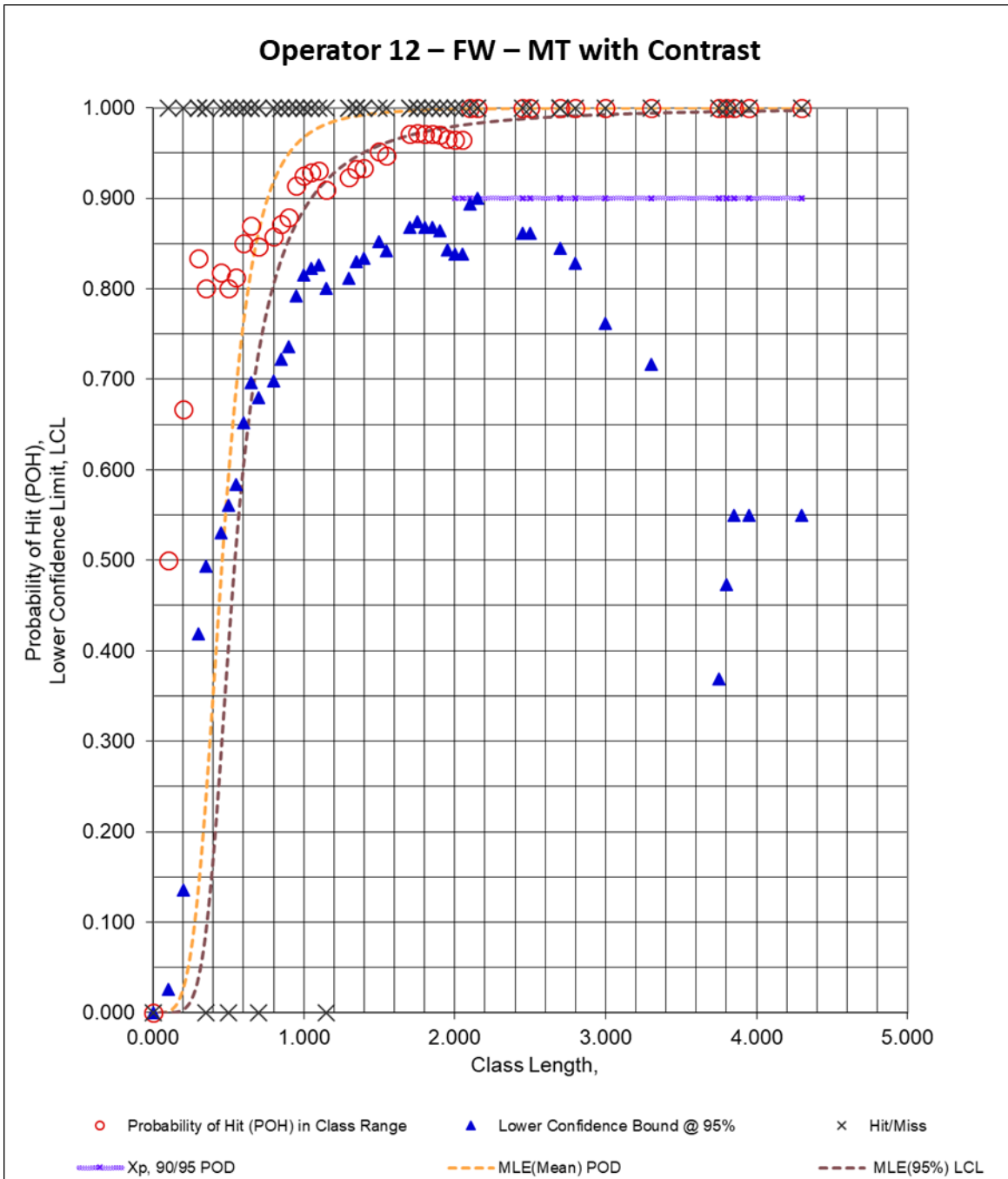


Figure 256. DOEPOD – FW – MT with Contrast – Operator 12

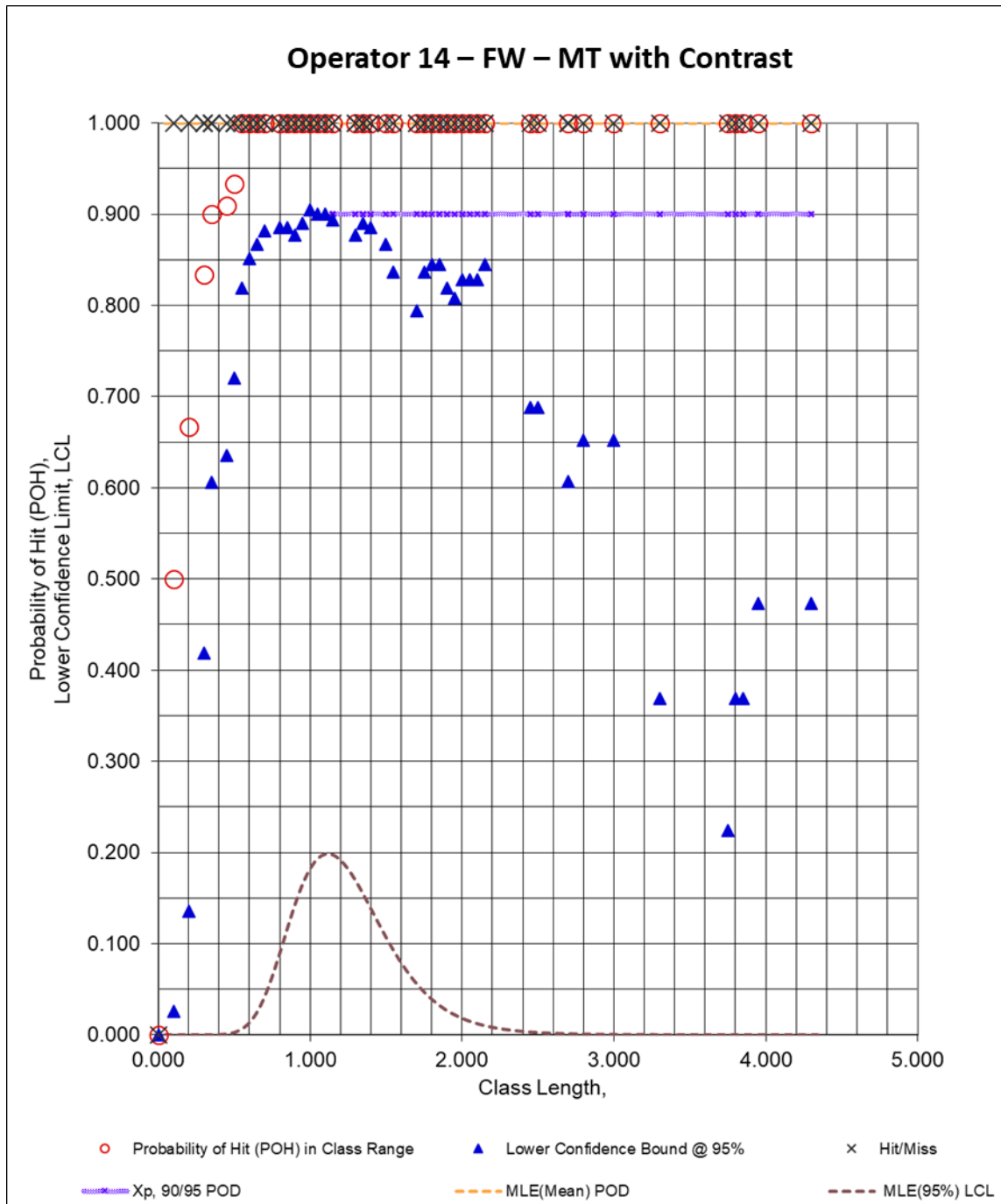


Figure 257. DOEPOD – FW – MT with Contrast – Operator 14

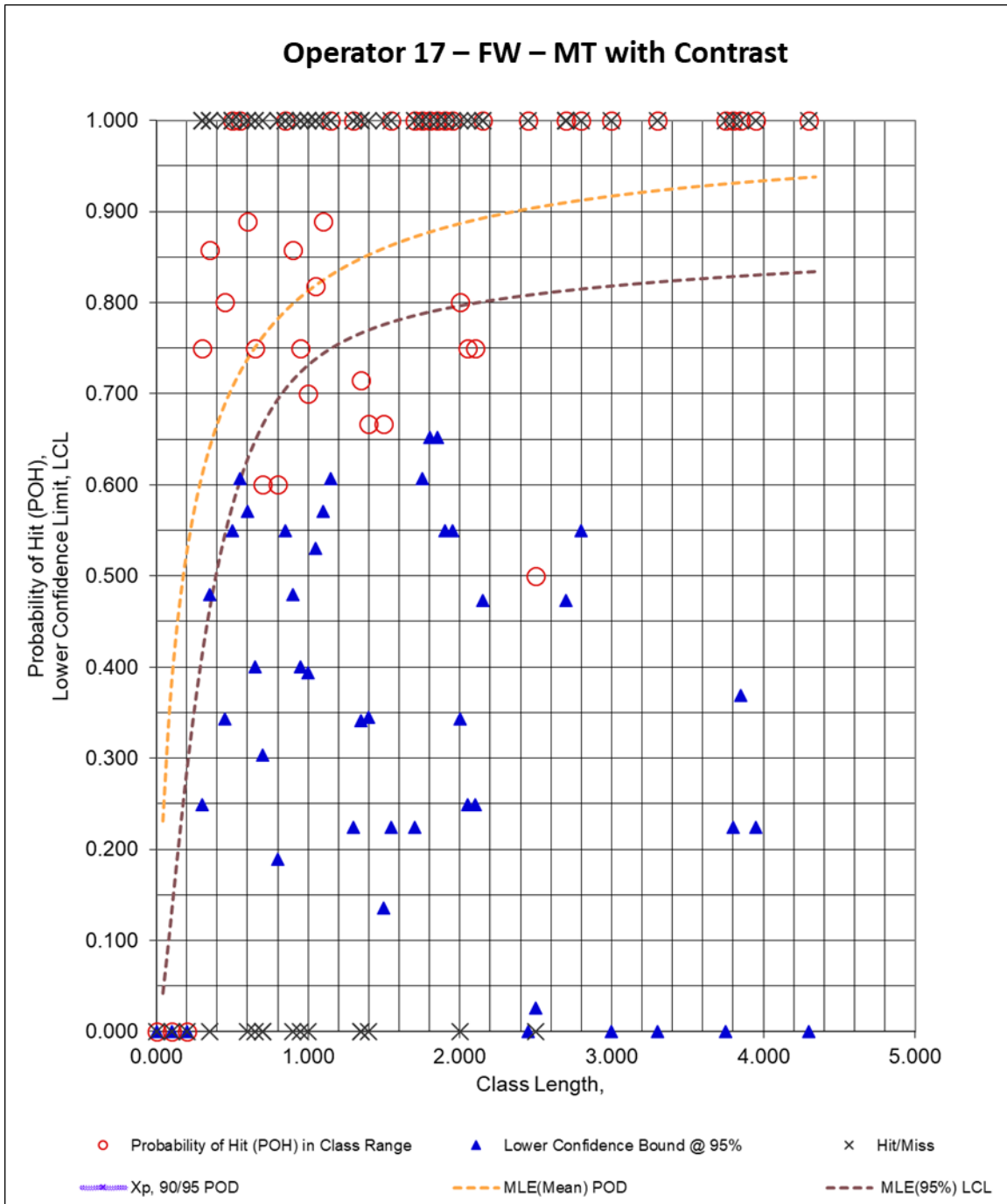


Figure 258. DOEPOD – FW – MT with Contrast – Operator 17

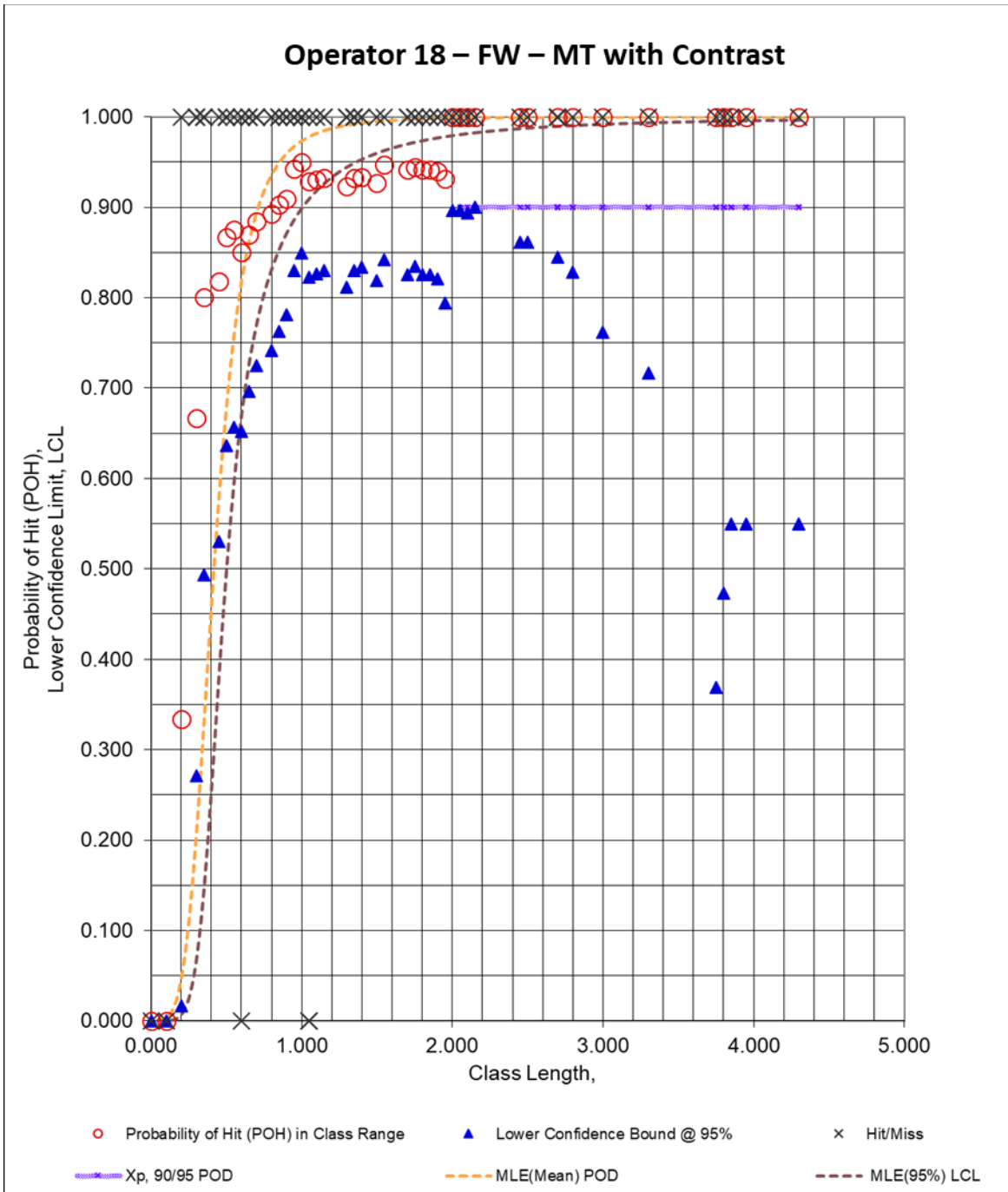


Figure 259. DOEPOD – FW – MT with Contrast – Operator 18

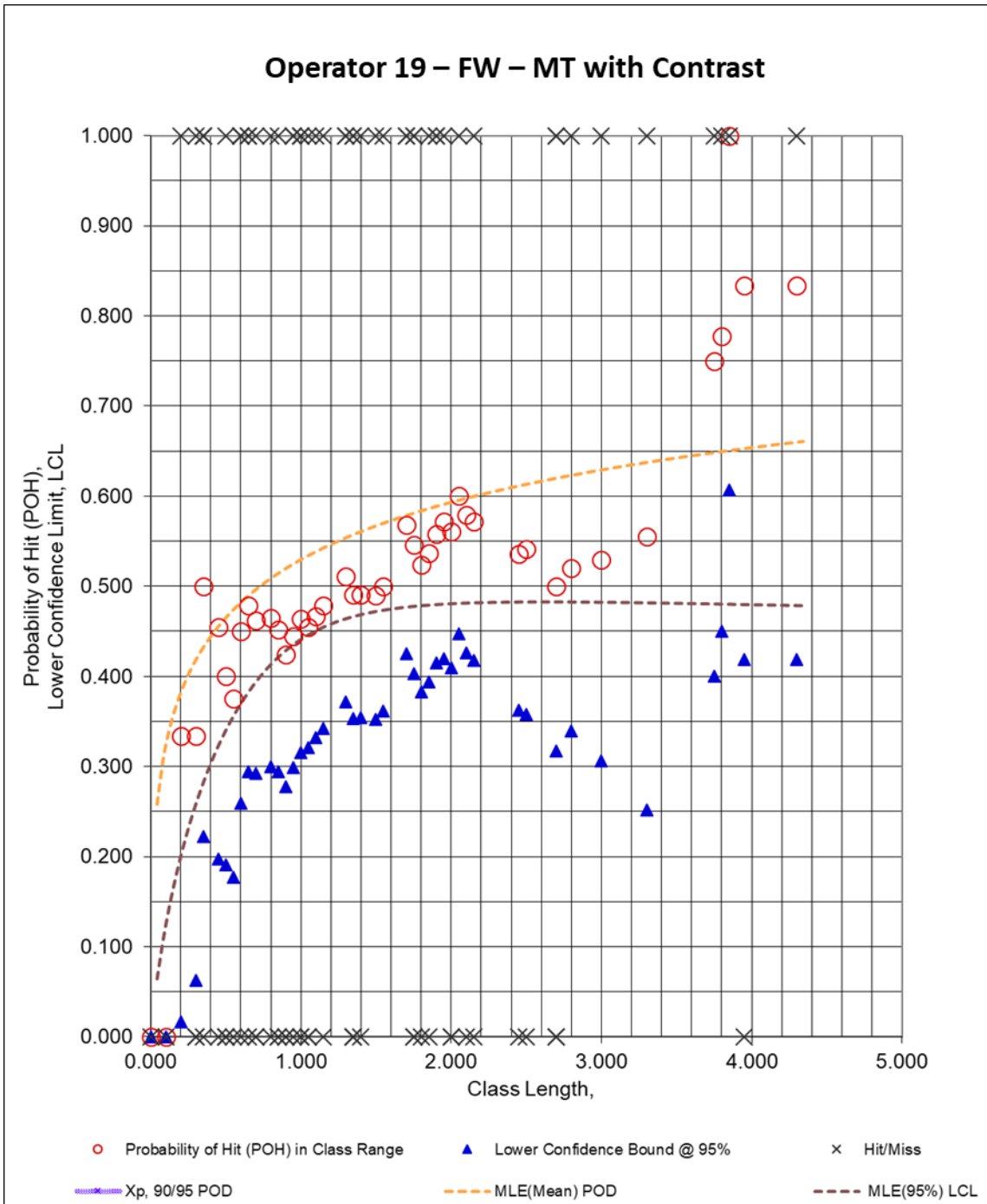


Figure 260. DOEPOD – FW – MT with Contrast – Operator 19

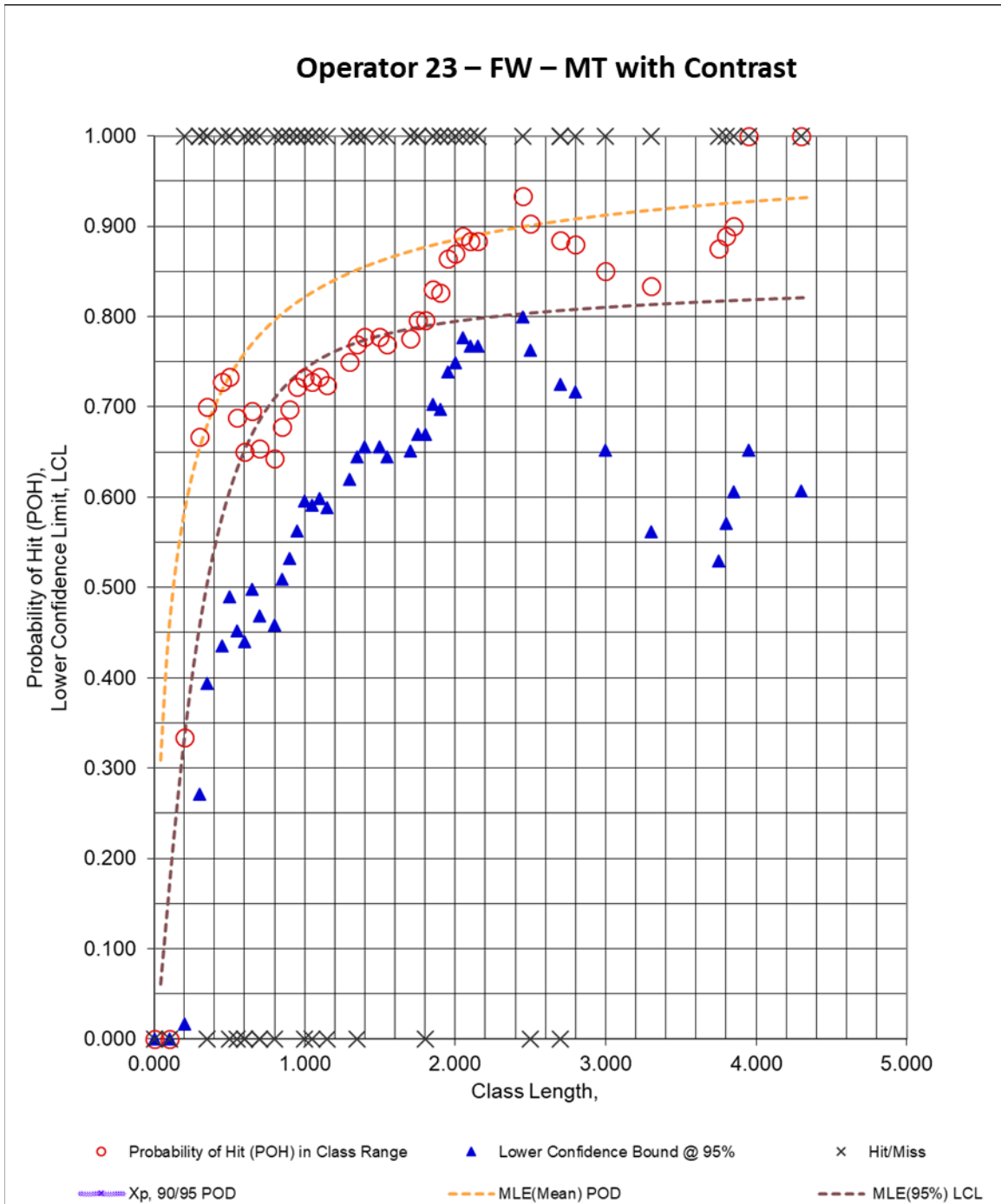


Figure 261. DOEPOD – FW – MT with Contrast – Operator 23

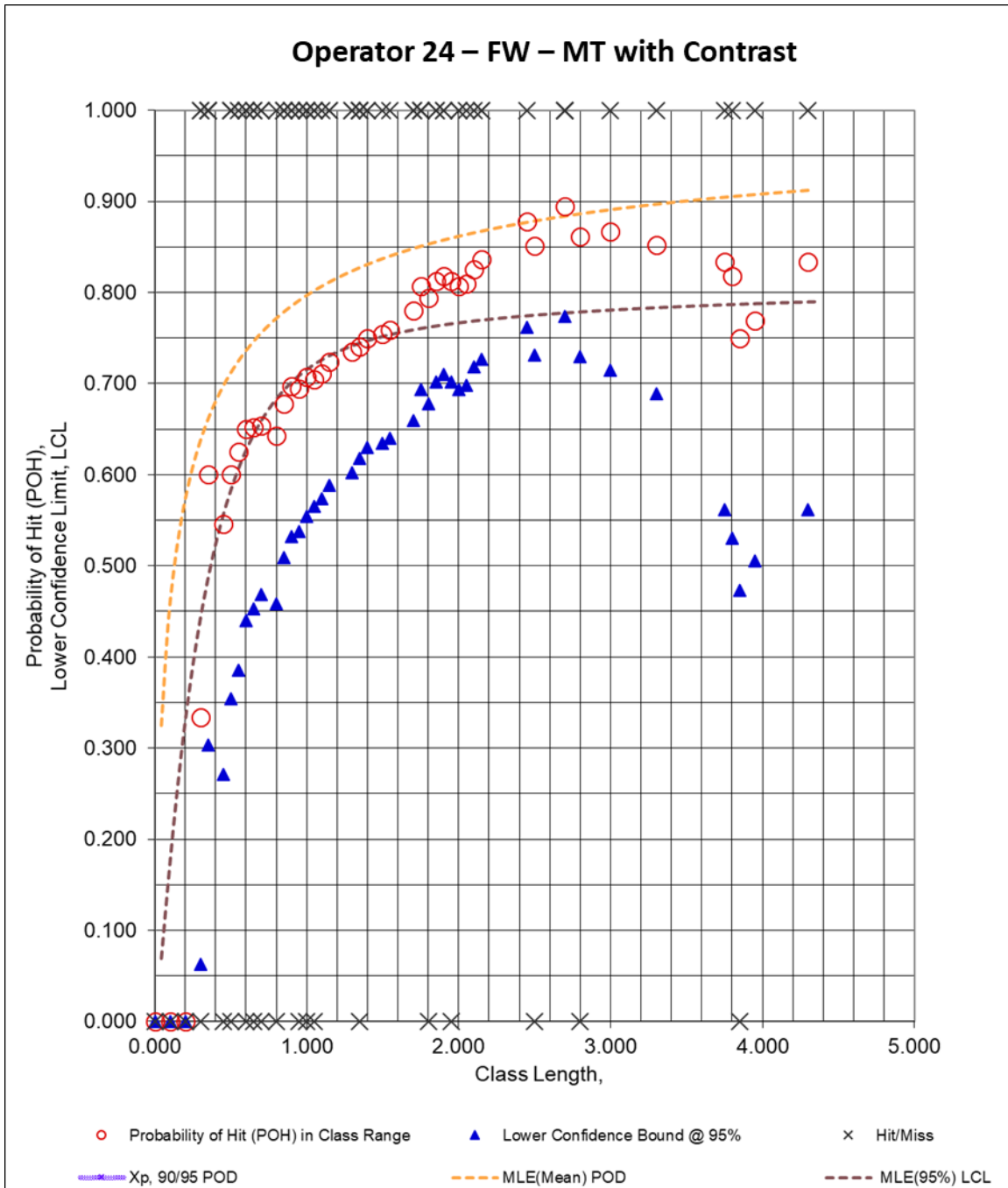


Figure 262. DOEPOD – FW – MT with Contrast – Operator 24

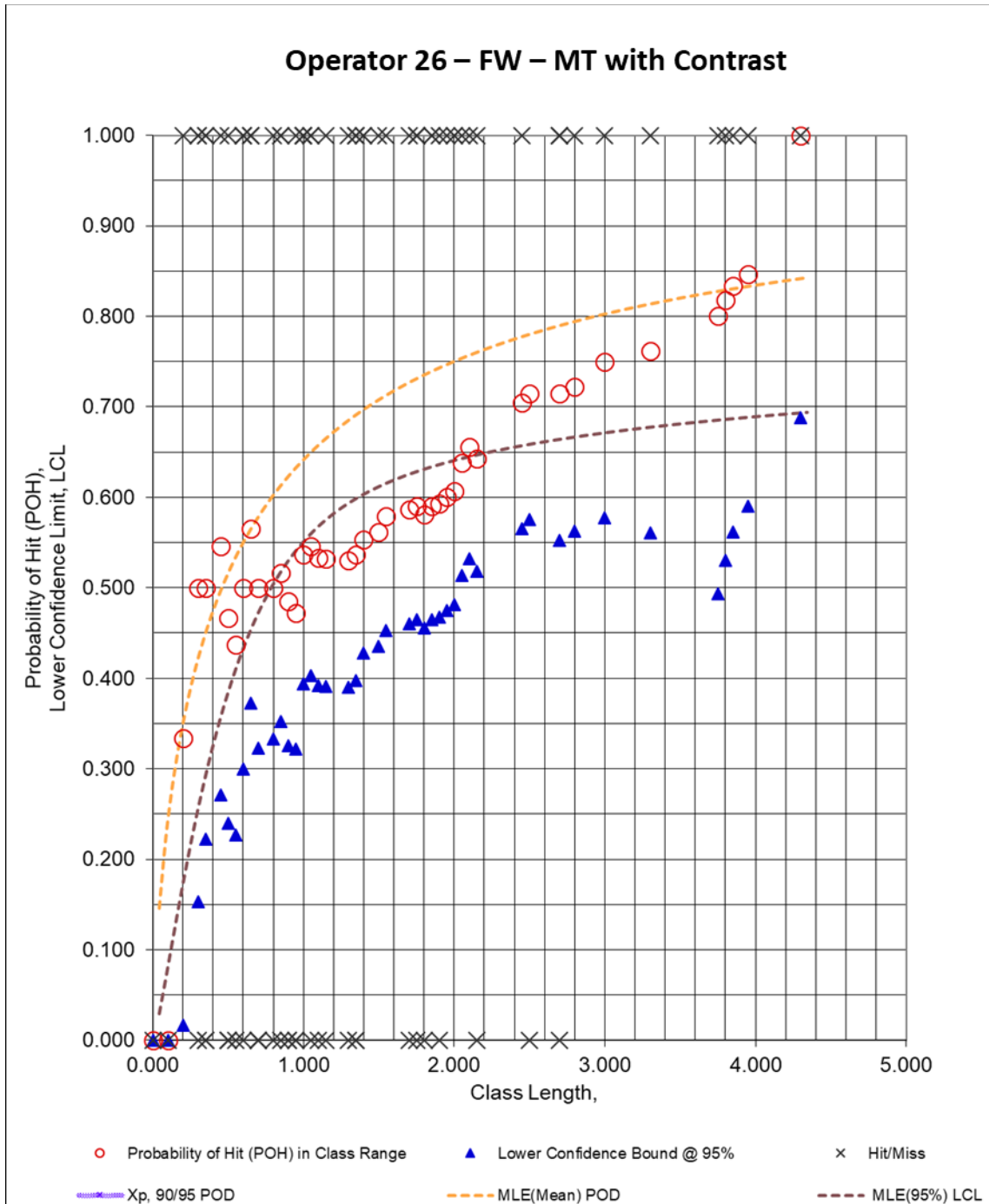


Figure 263. DOEPOD – FW – MT with Contrast – Operator 26

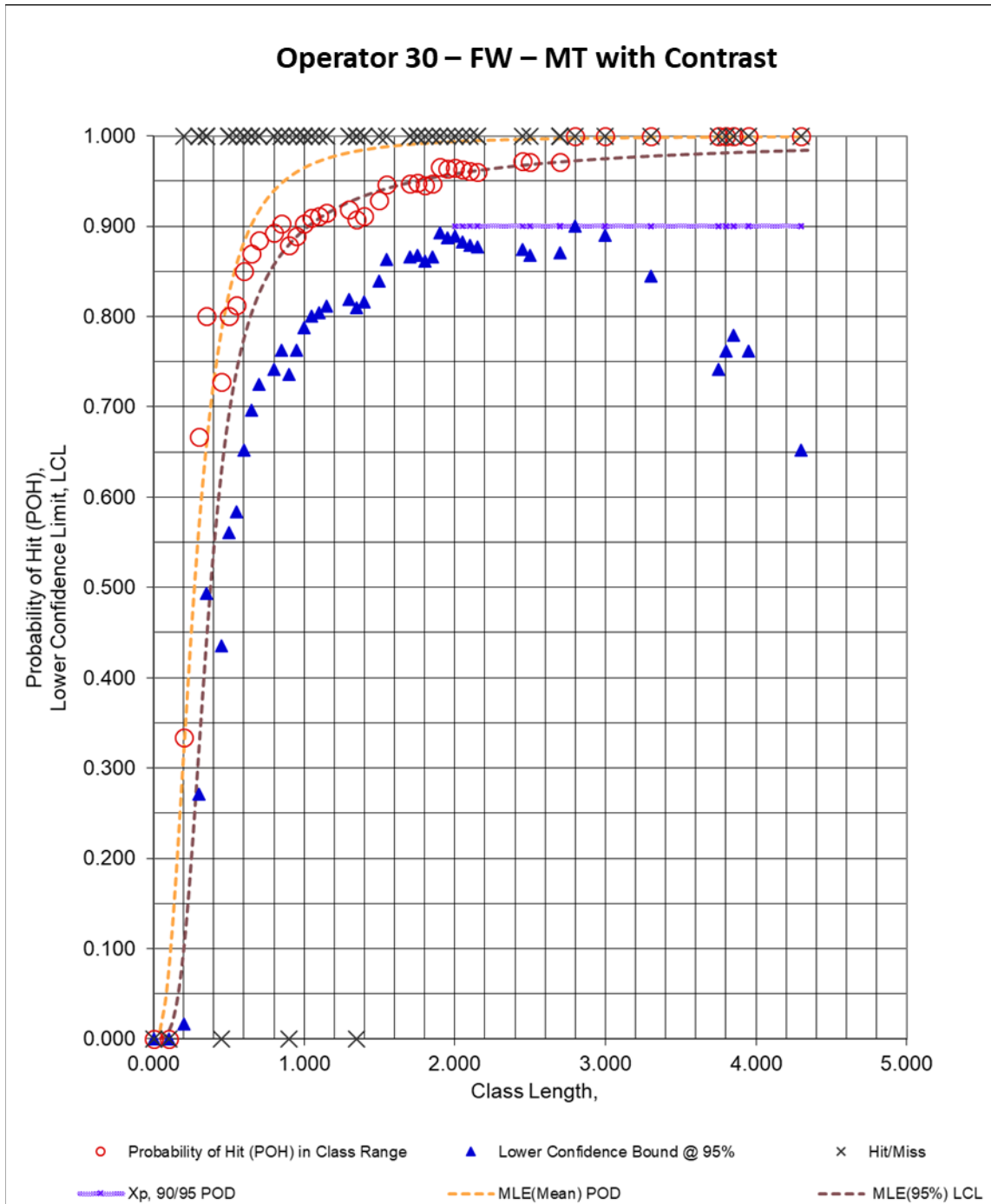


Figure 264. DOEPOD – FW – MT with Contrast – Operator 30

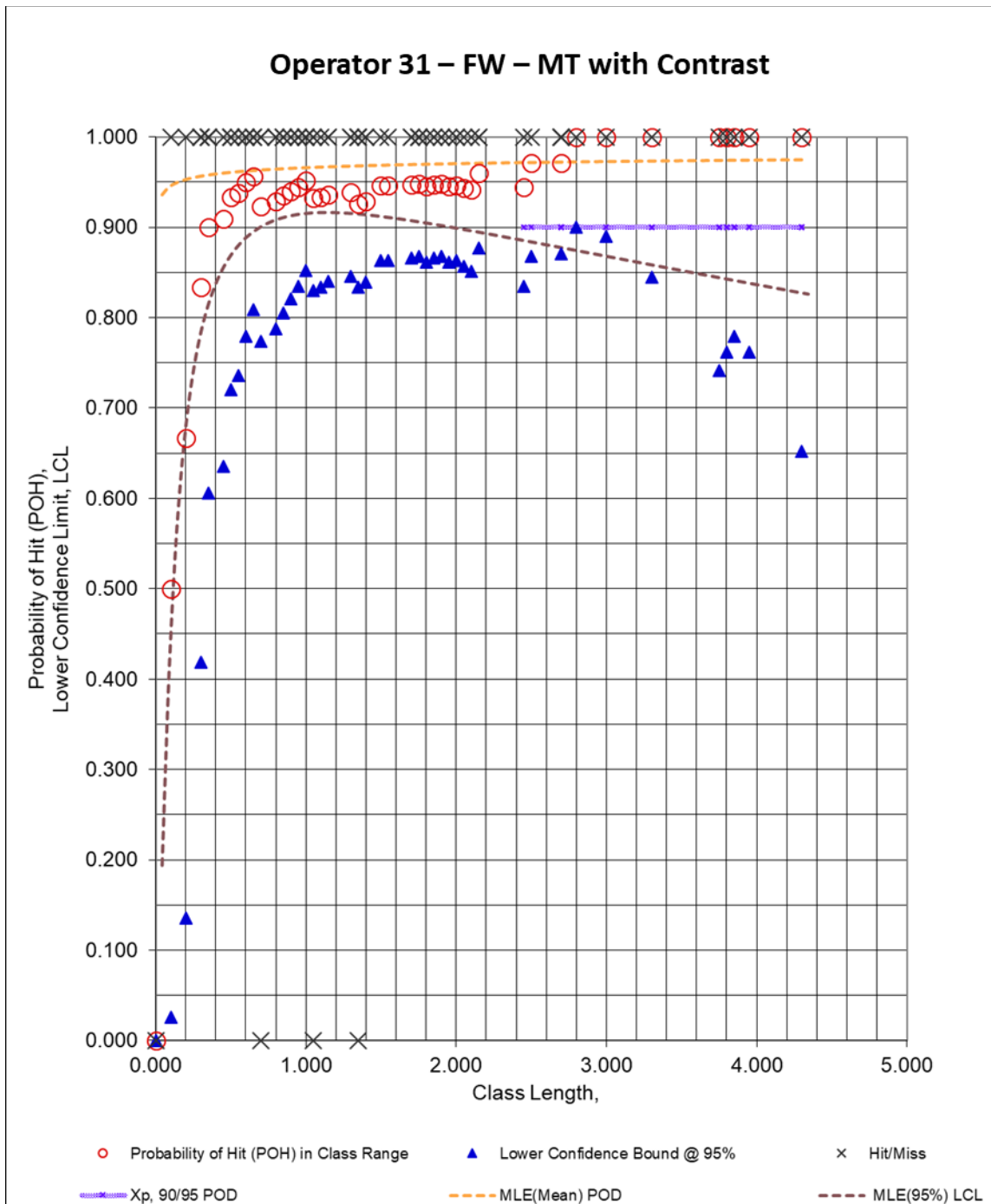


Figure 265. DOEPOD – FW – MT with Contrast – Operator 31

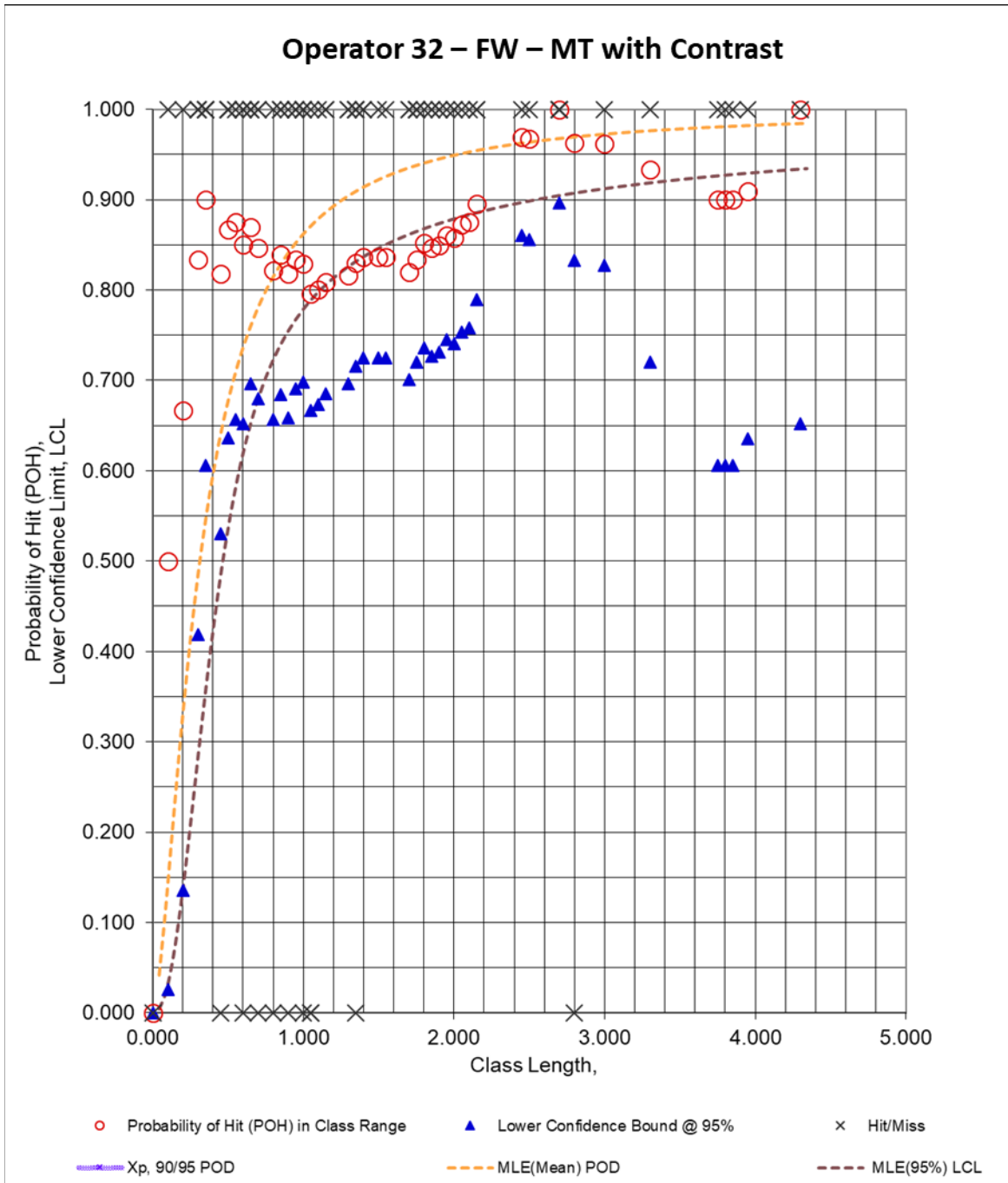


Figure 266. DOEPOD – FW – MT with Contrast – Operator 32

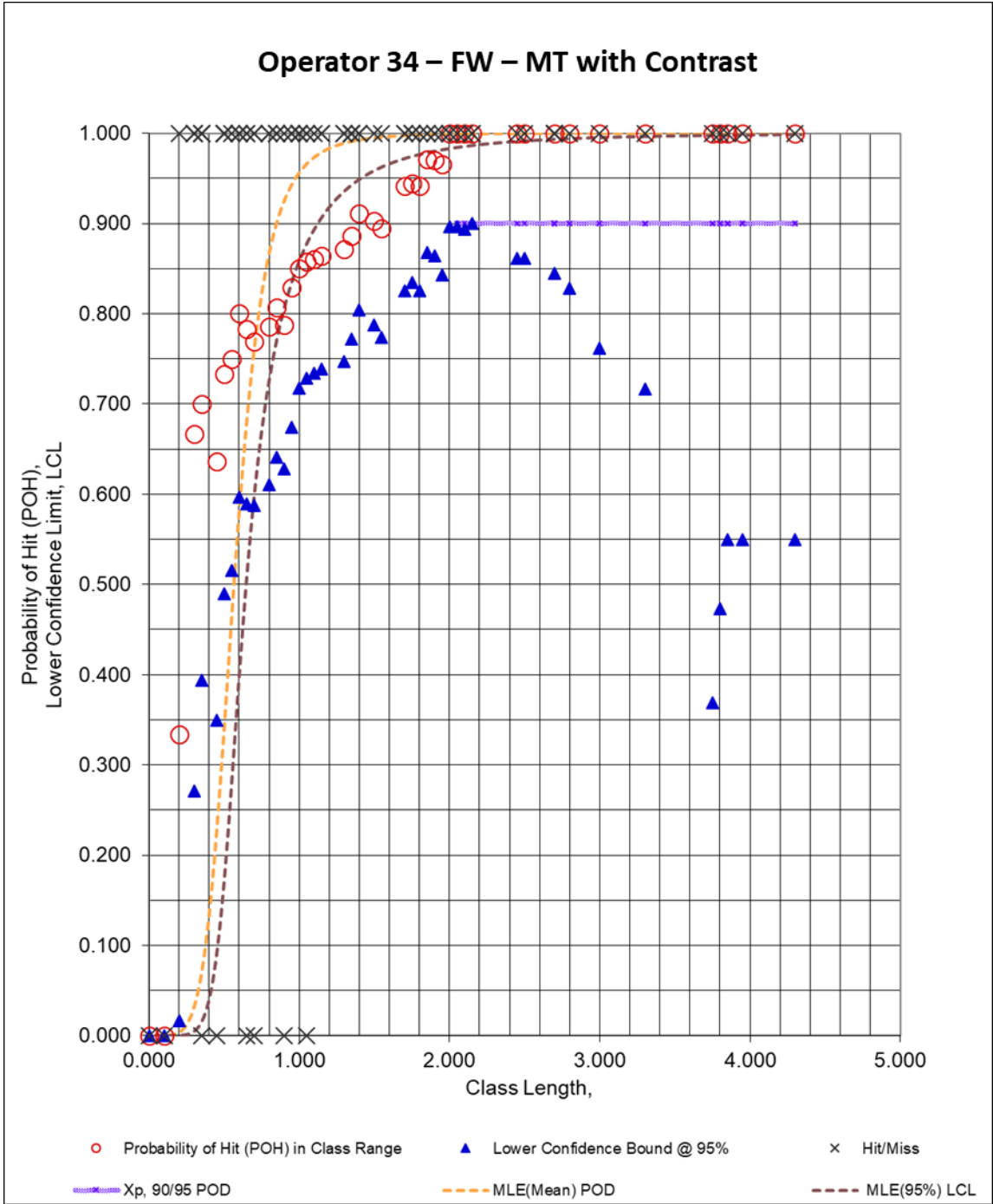


Figure 267. DOEPOD – FW – MT with Contrast – Operator 34

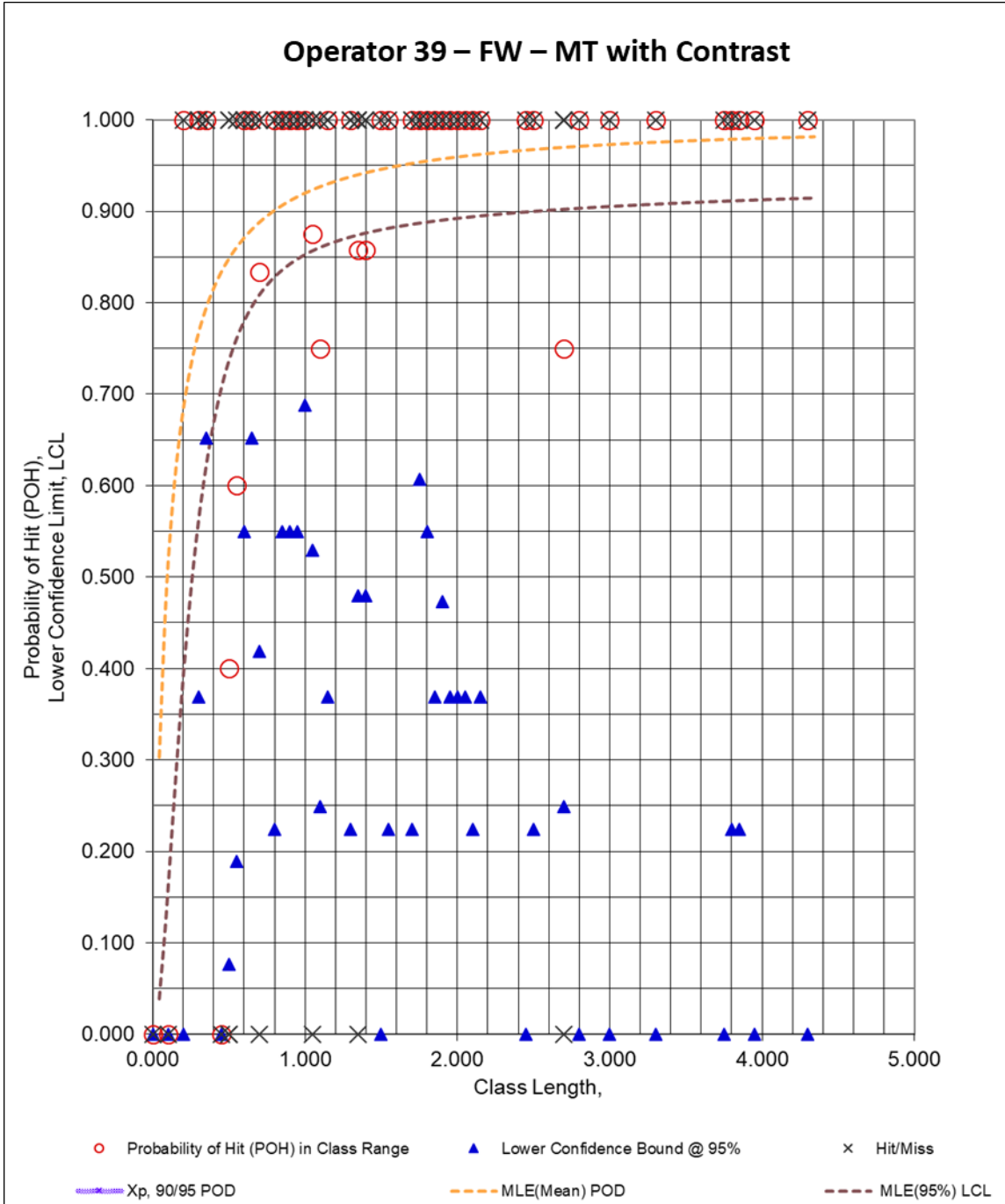


Figure 268. DOEPOD – FW – MT with Contrast – Operator 39

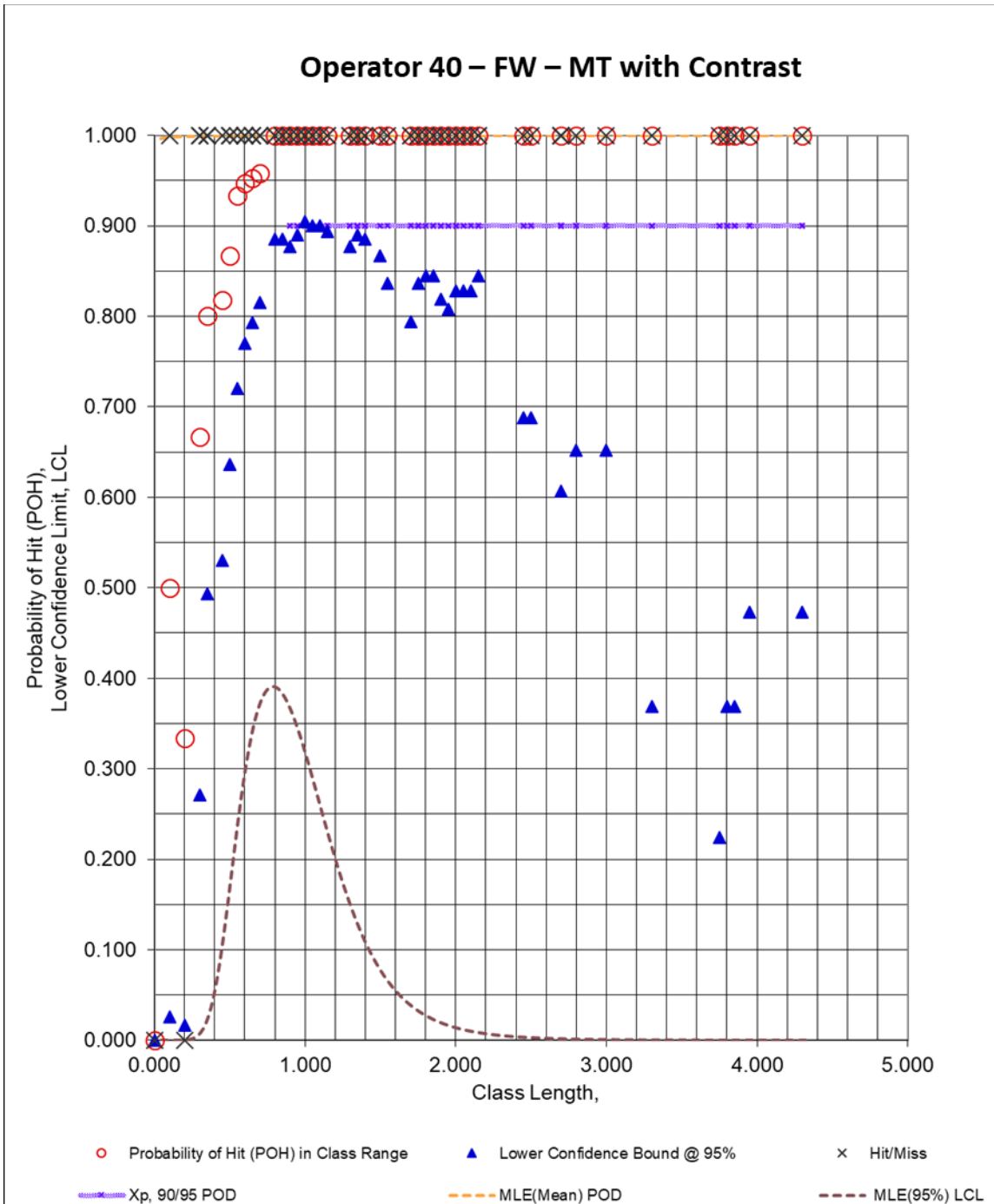


Figure 269. DOEPOD – FW – MT with Contrast – Operator 40

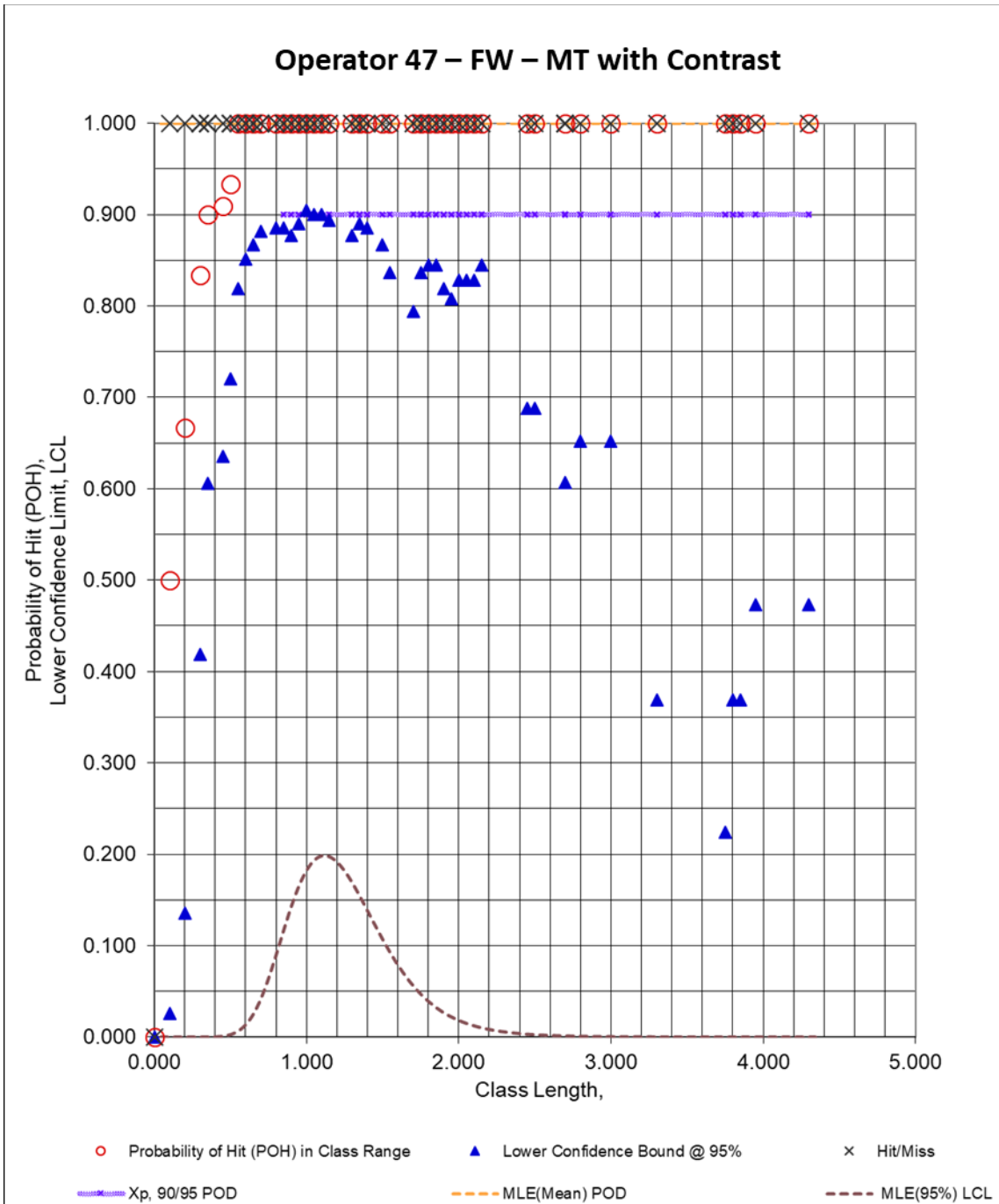


Figure 270. DOEPOD – FW – MT with Contrast – Operator 47

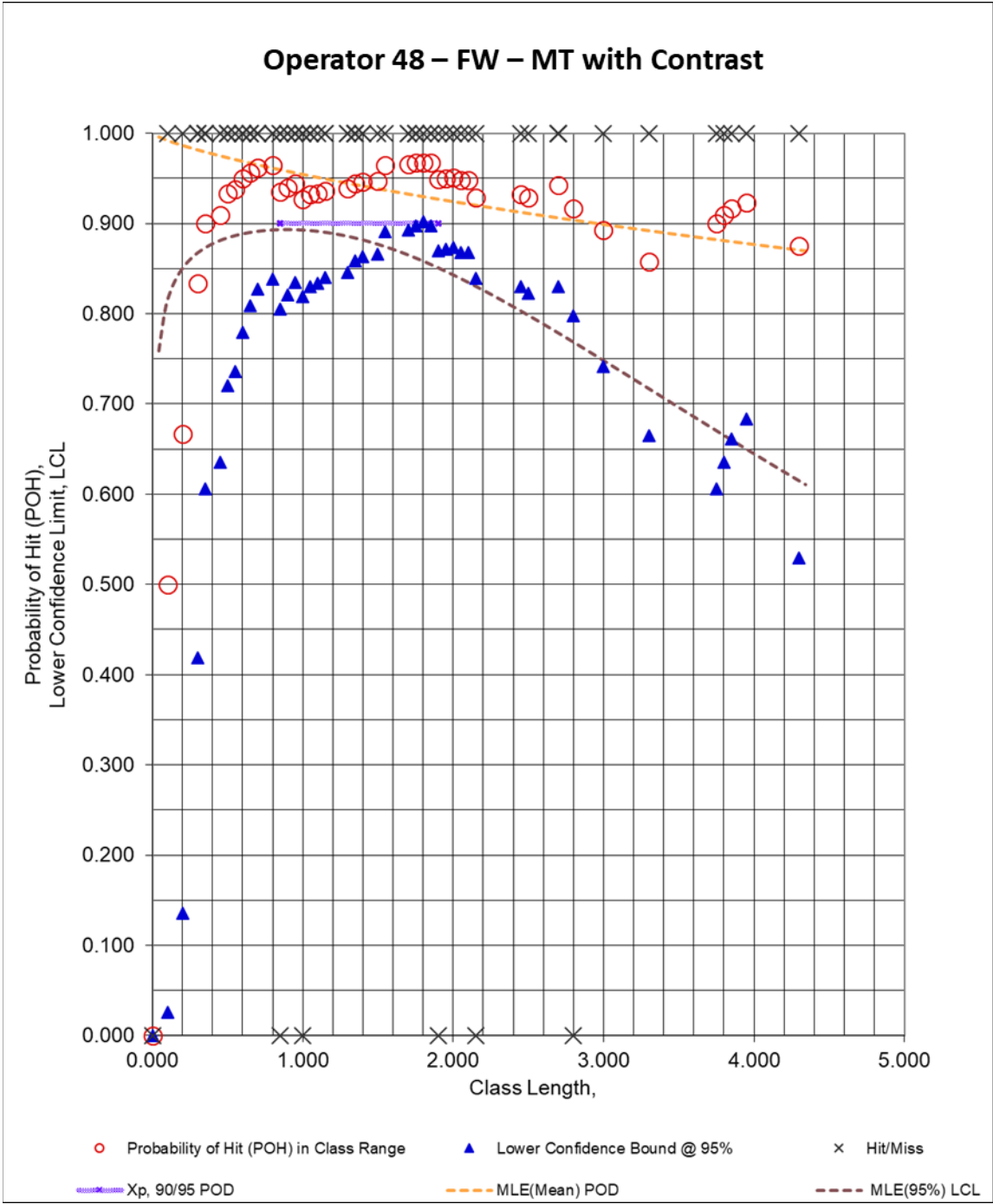


Figure 271. DOEPOD – FW – MT with Contrast – Operator 48

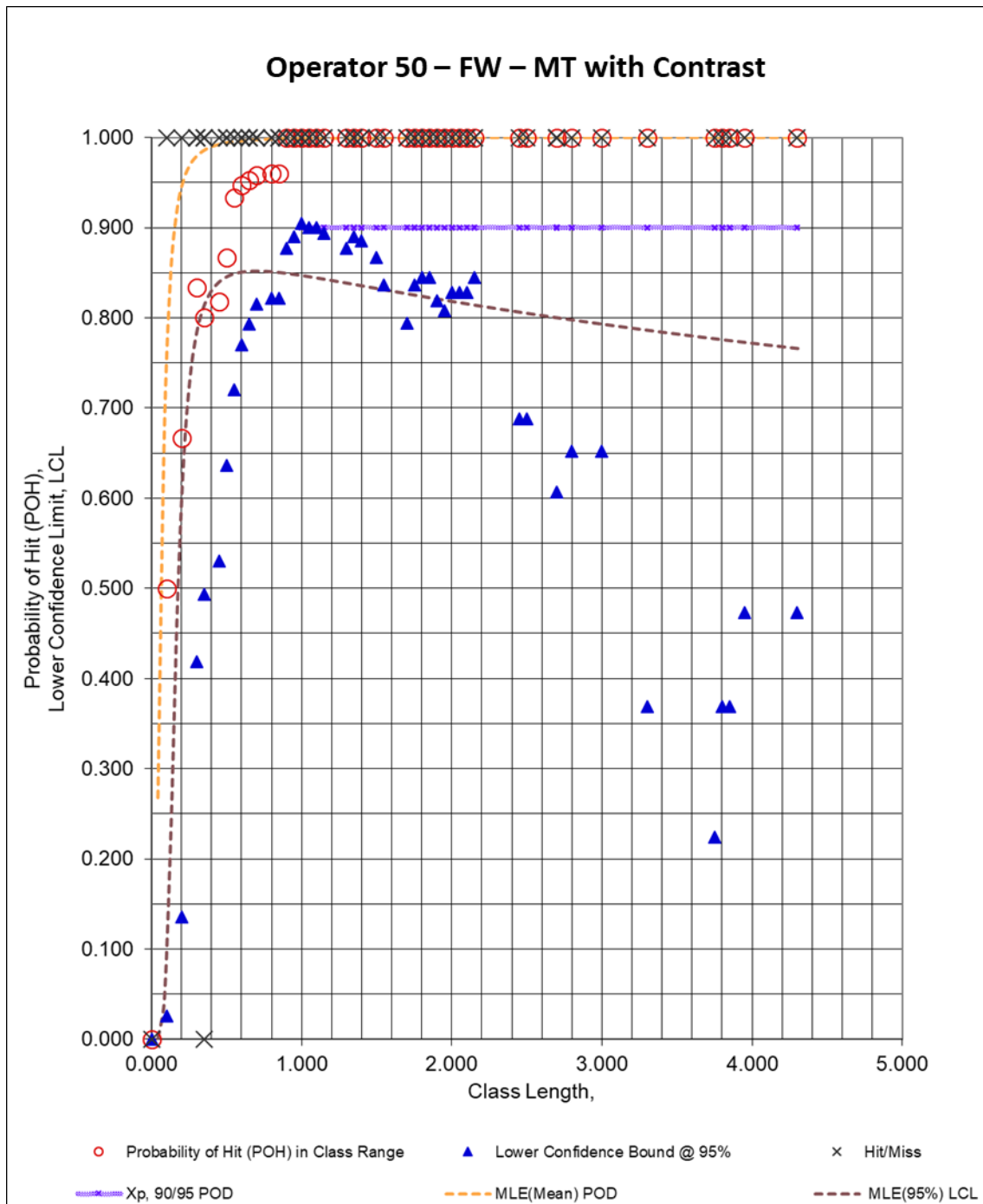


Figure 272. DOEPOD – FW – MT with Contrast – Operator 50

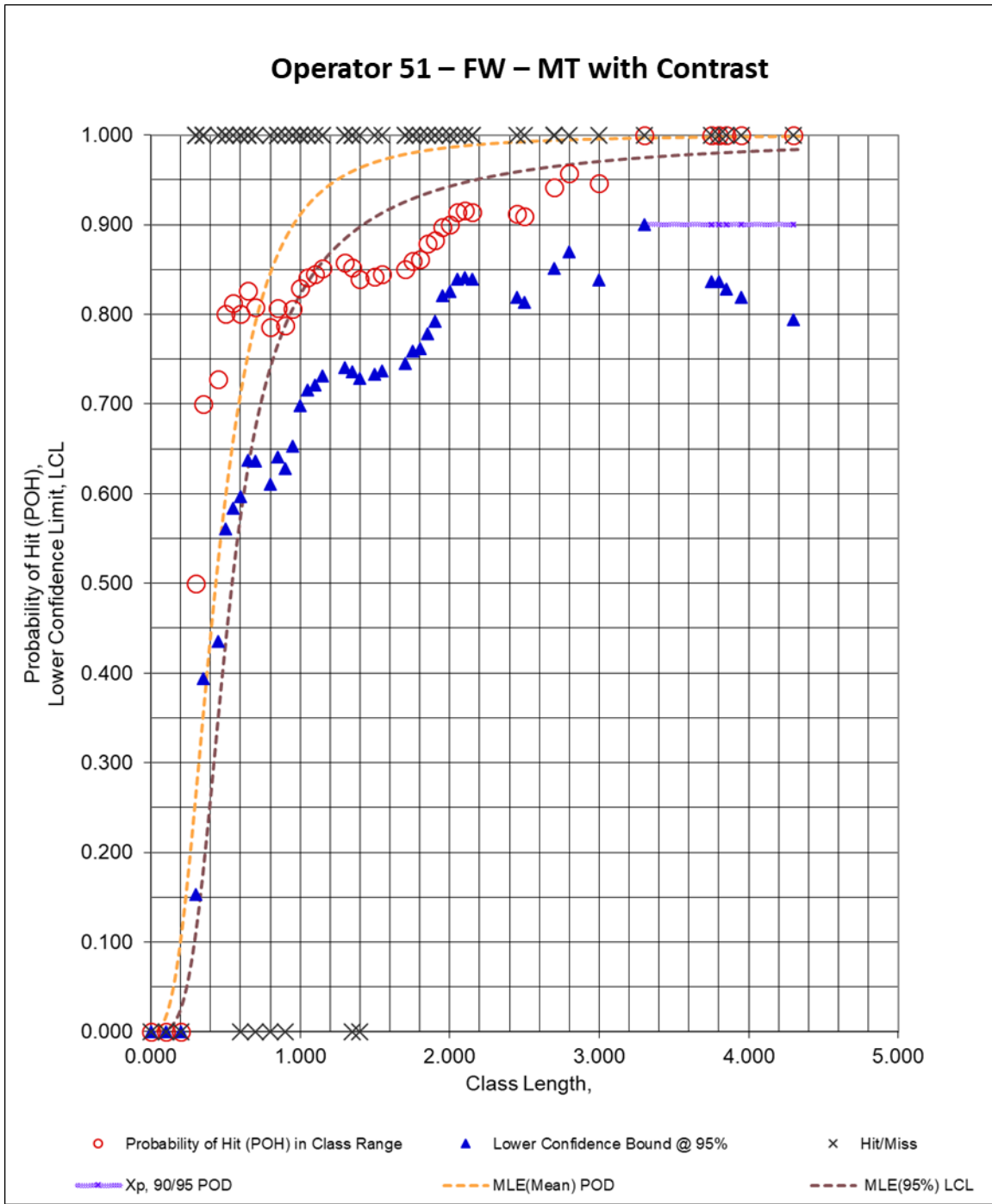


Figure 273. DOEPOD – FW – MT with Contrast – Operator 51

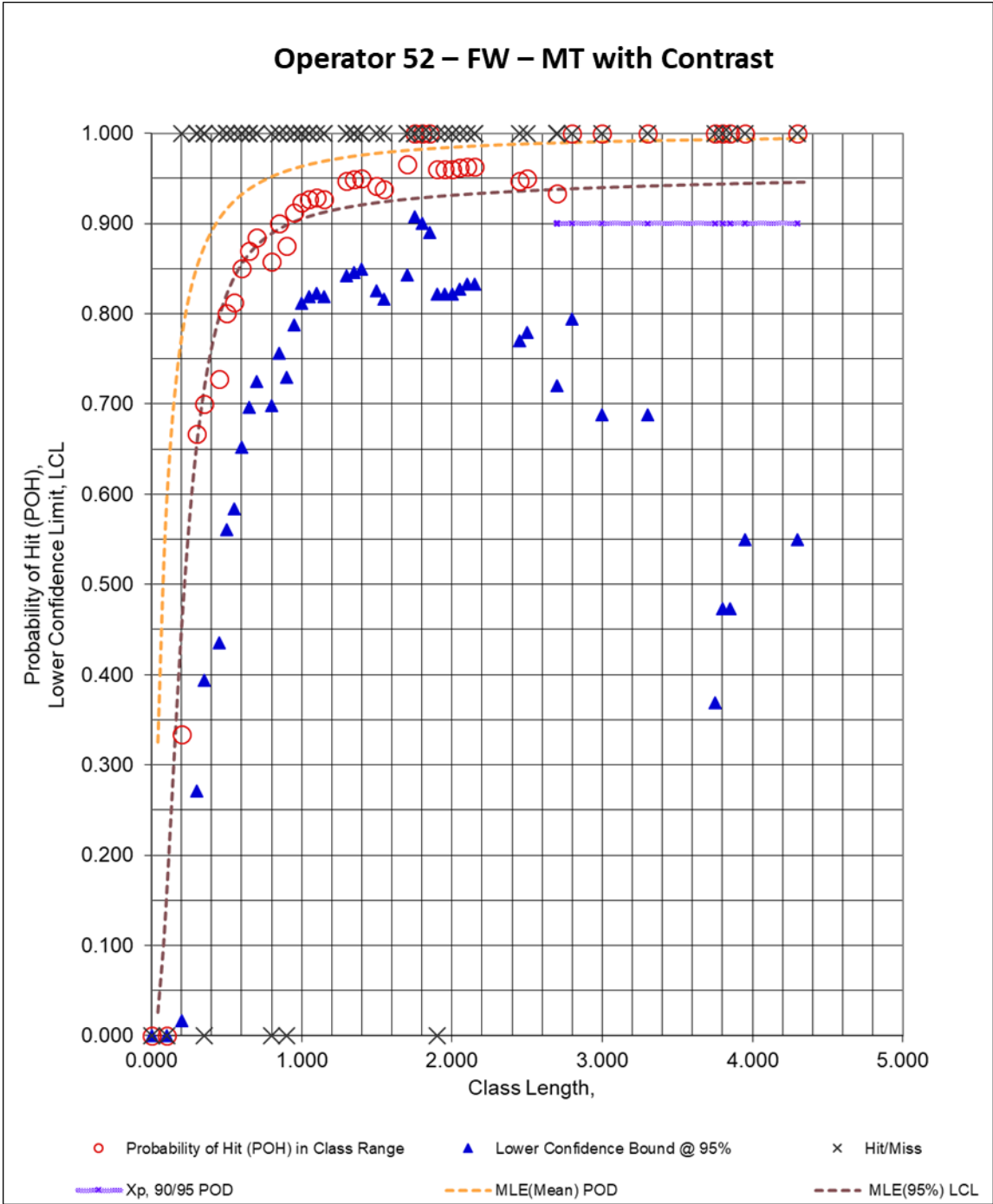


Figure 274. DOEPOD – FW – MT with Contrast – Operator 52

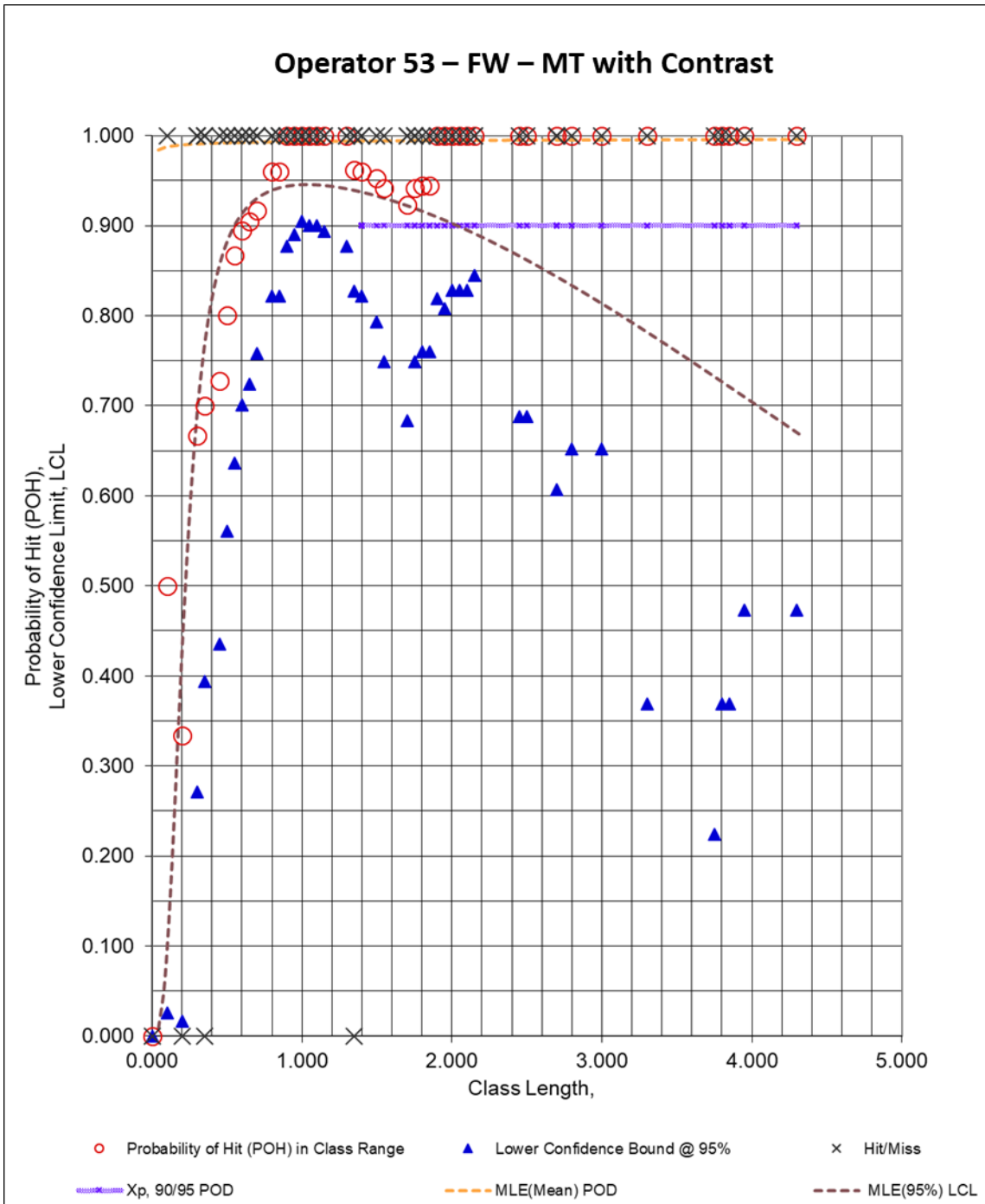


Figure 275. DOEPOD – FW – MT with Contrast – Operator 53

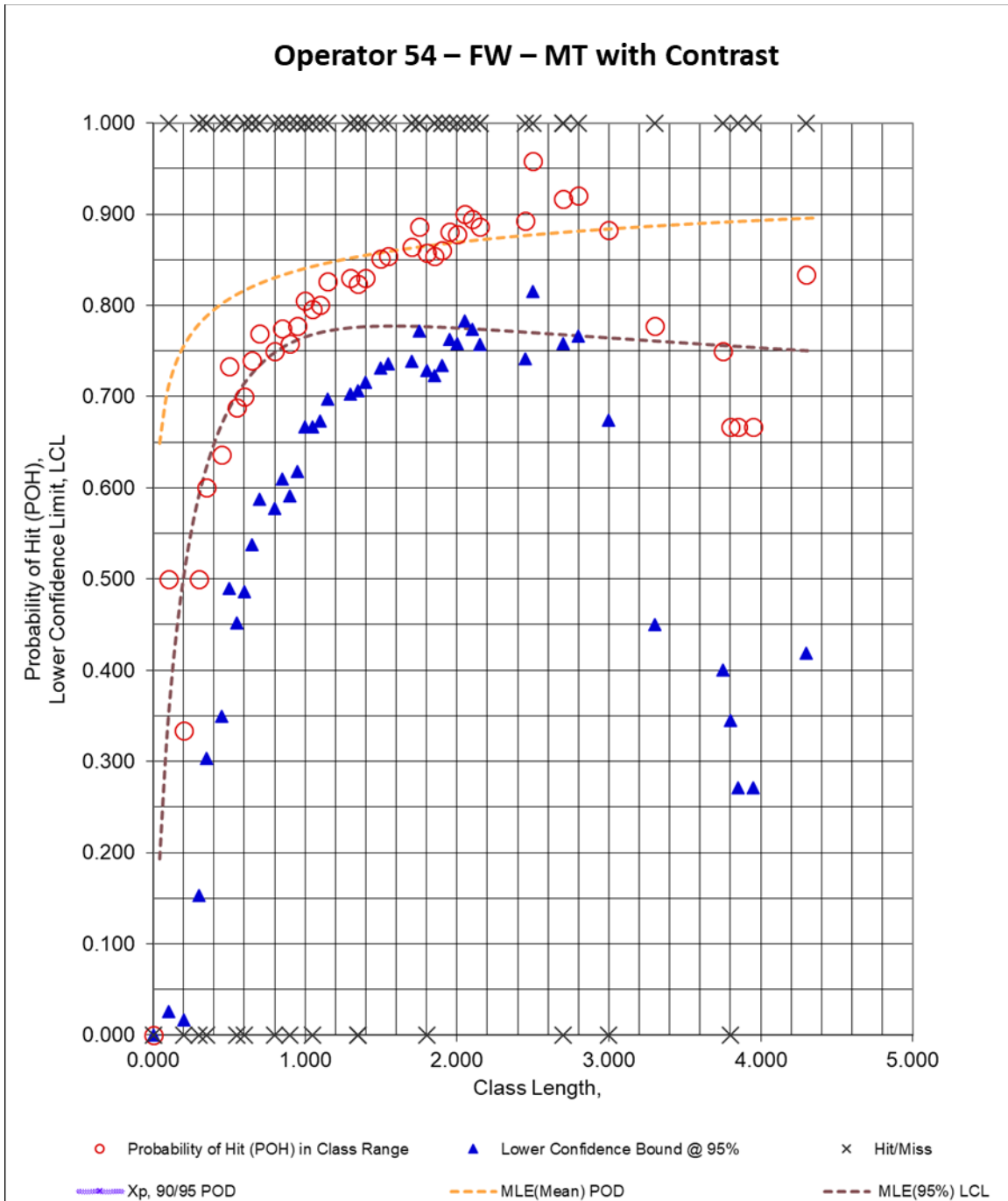


Figure 276. DOEPOD – FW – MT with Contrast – Operator 54

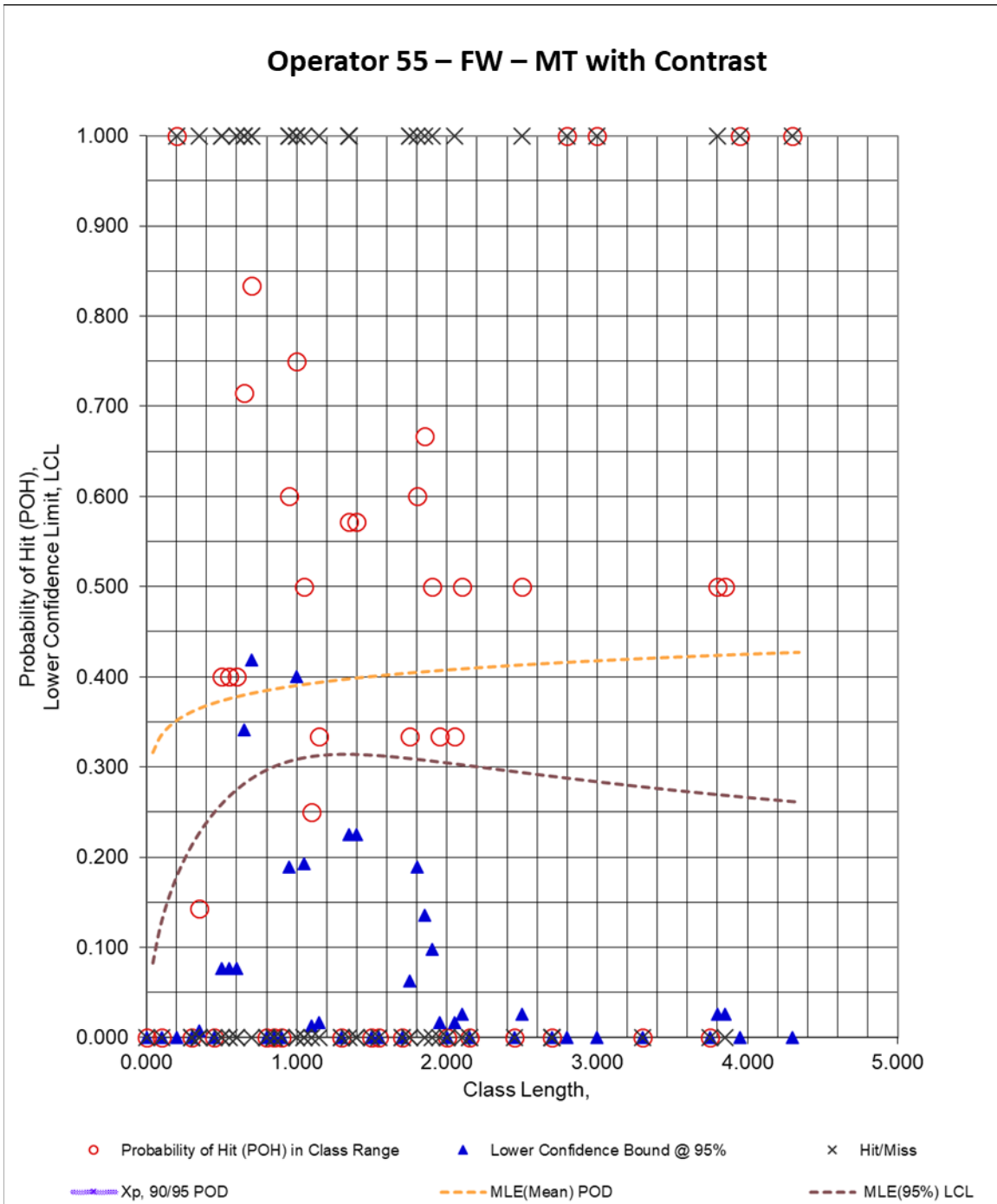


Figure 277. DOEPOD – FW – MT with Contrast – Operator 55

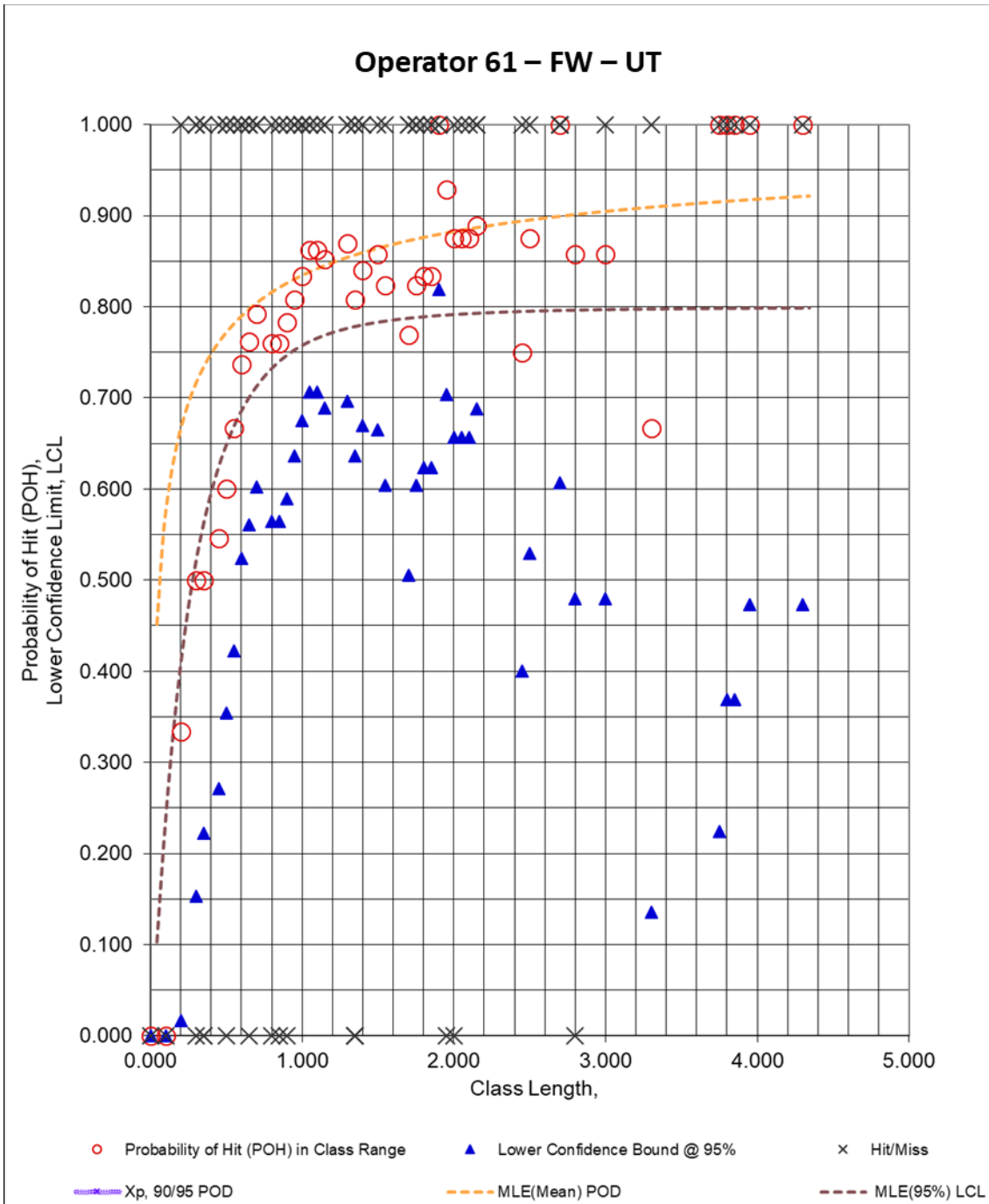


Figure 278. DOEPOD – FW – UT – Operator 61

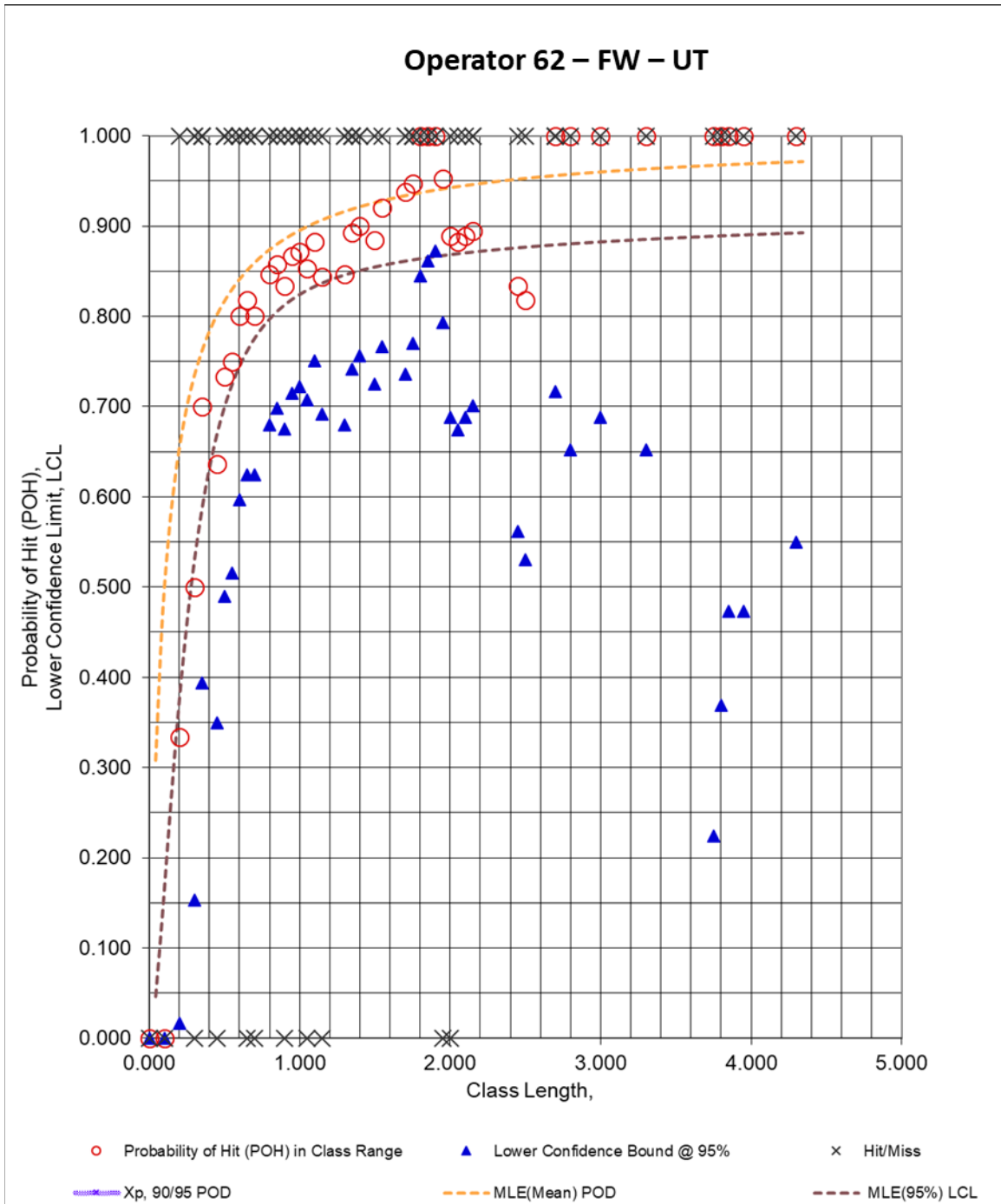


Figure 279. DOEPOD – FW – UT – Operator 62

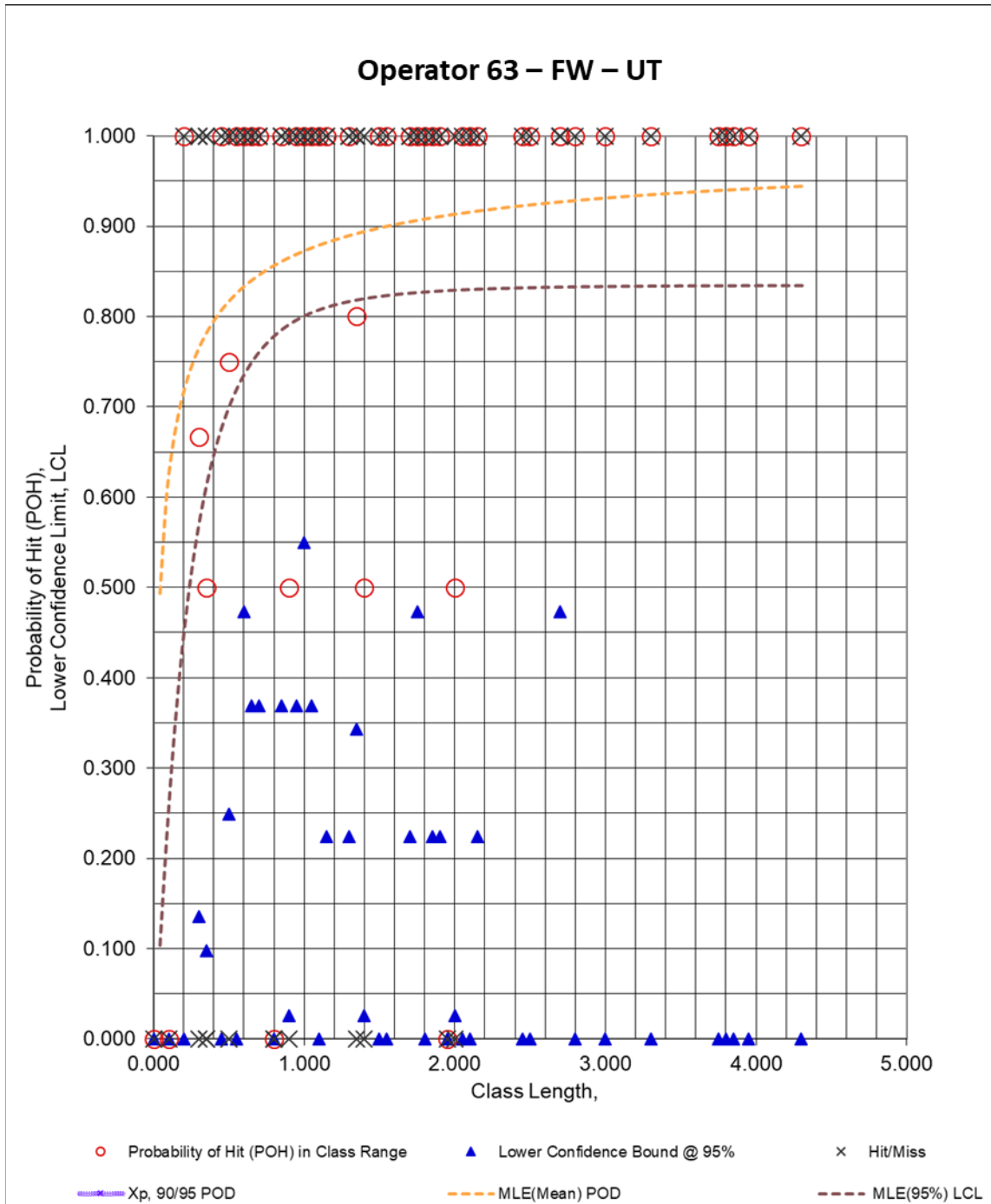


Figure 280. DOEPOD – FW – UT – Operator 63

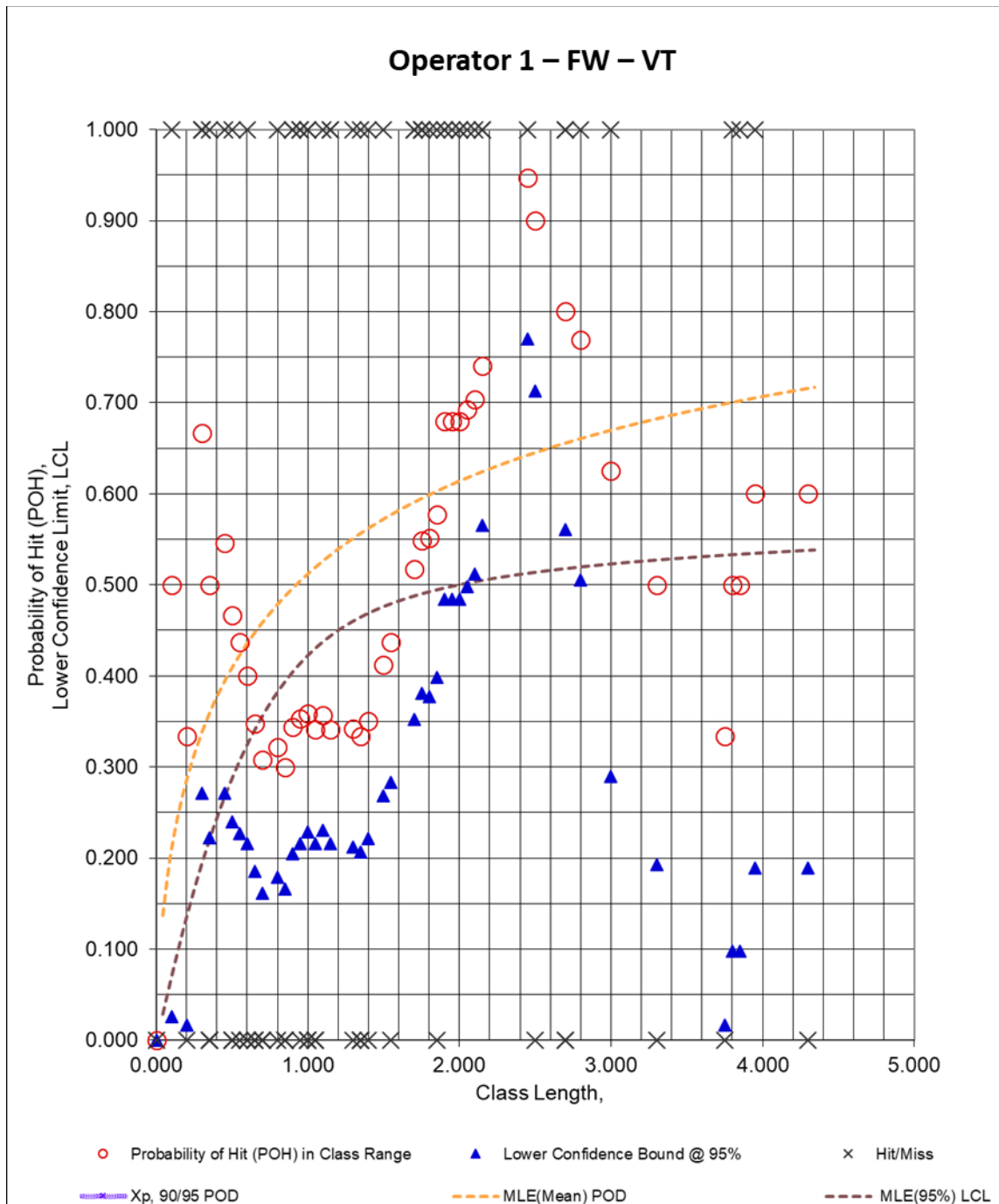


Figure 281. DOEPOD – FW – VT – Operator 1

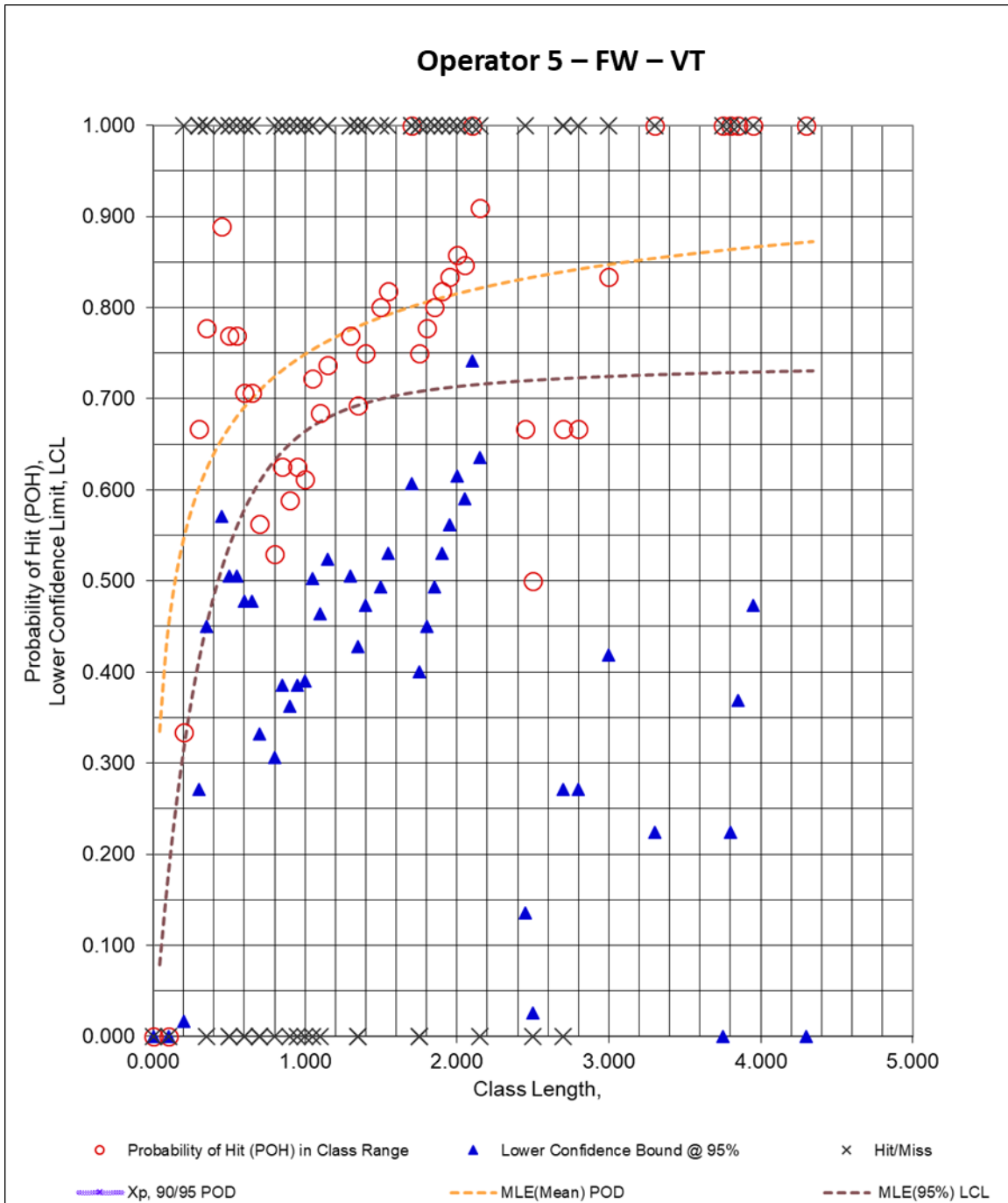


Figure 282. DOEPOD – FW – VT – Operator 5

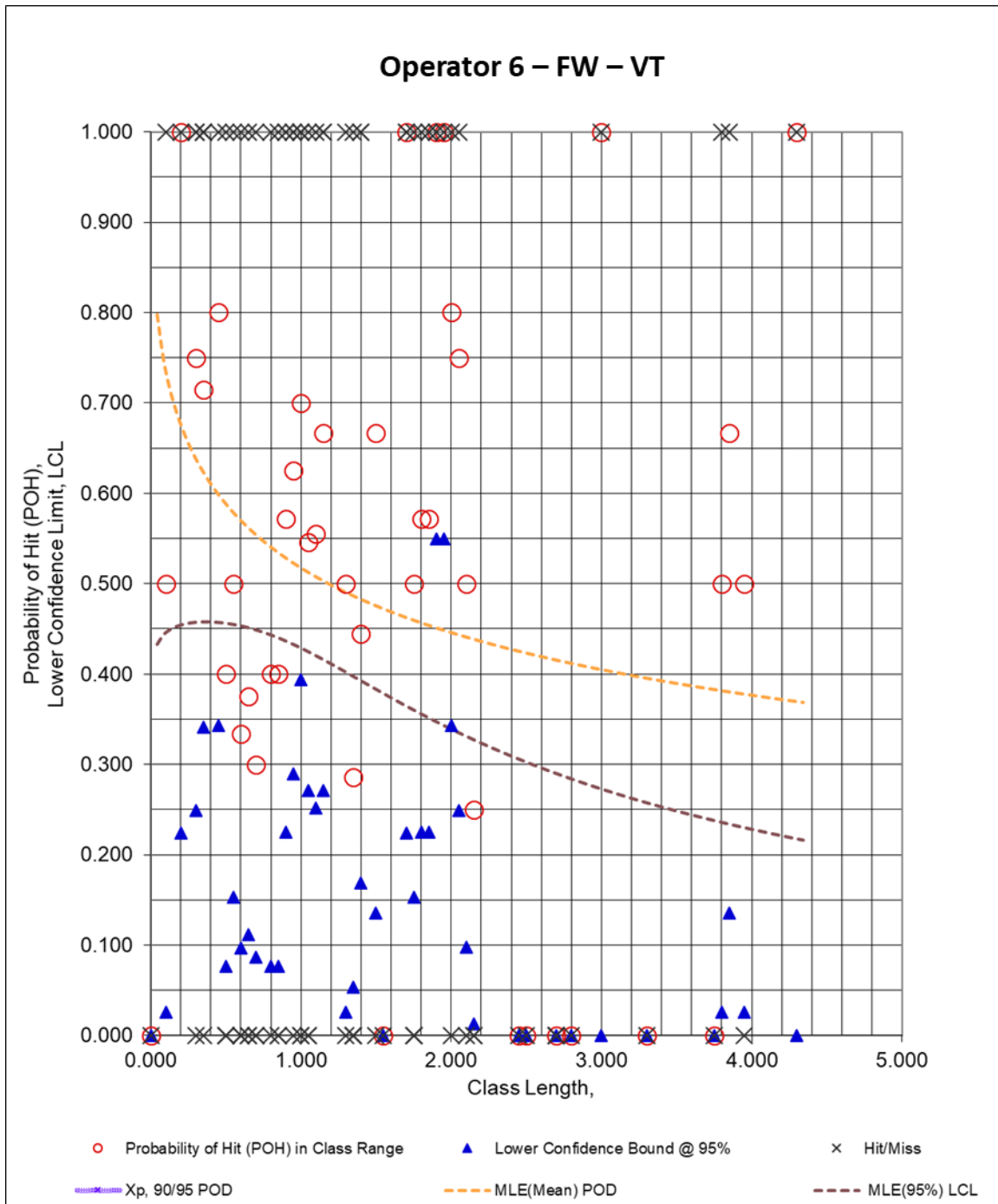


Figure 283. DOEPOD – FW – VT – Operator 6

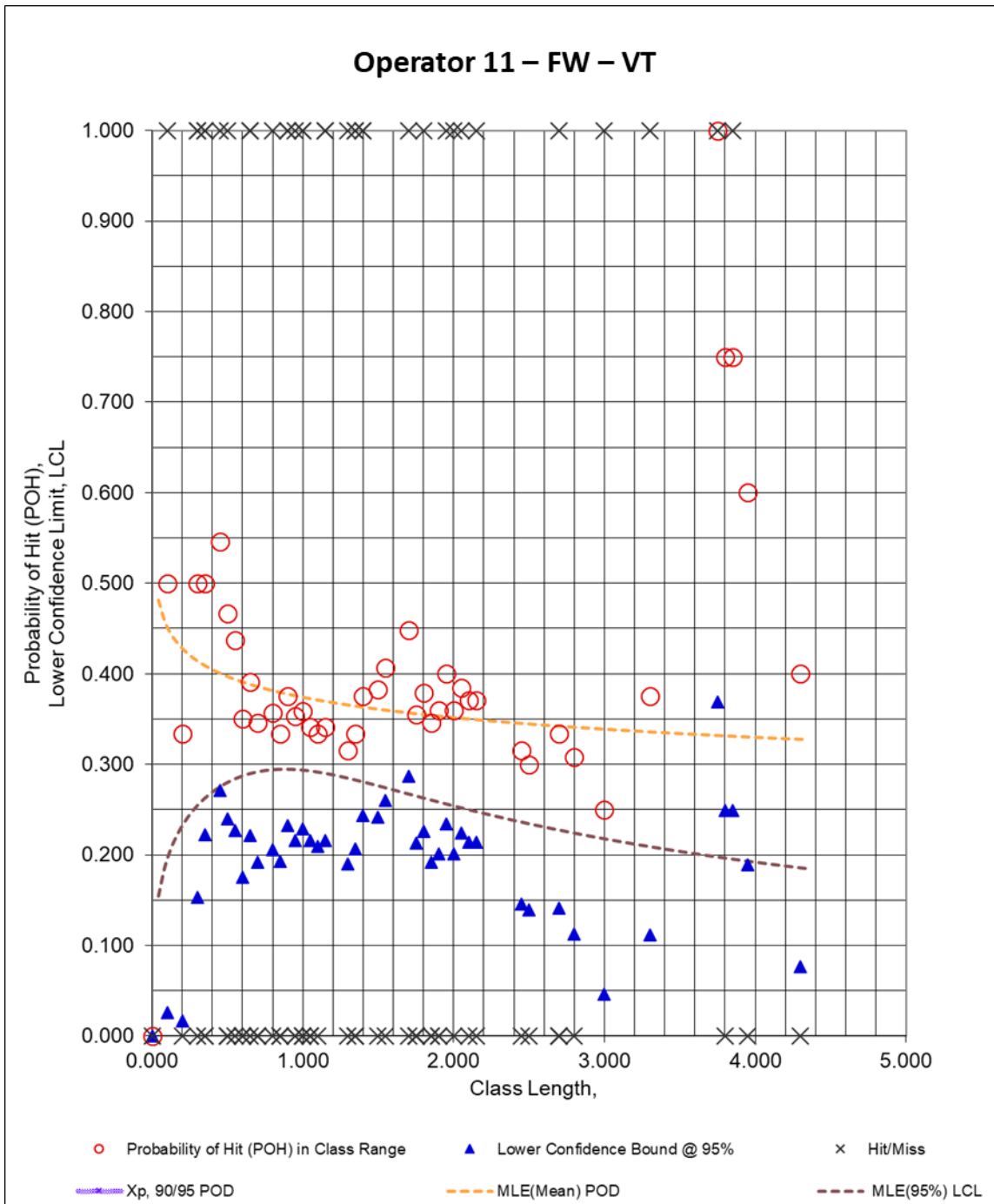


Figure 284. DOEPOD – FW – VT – Operator 11

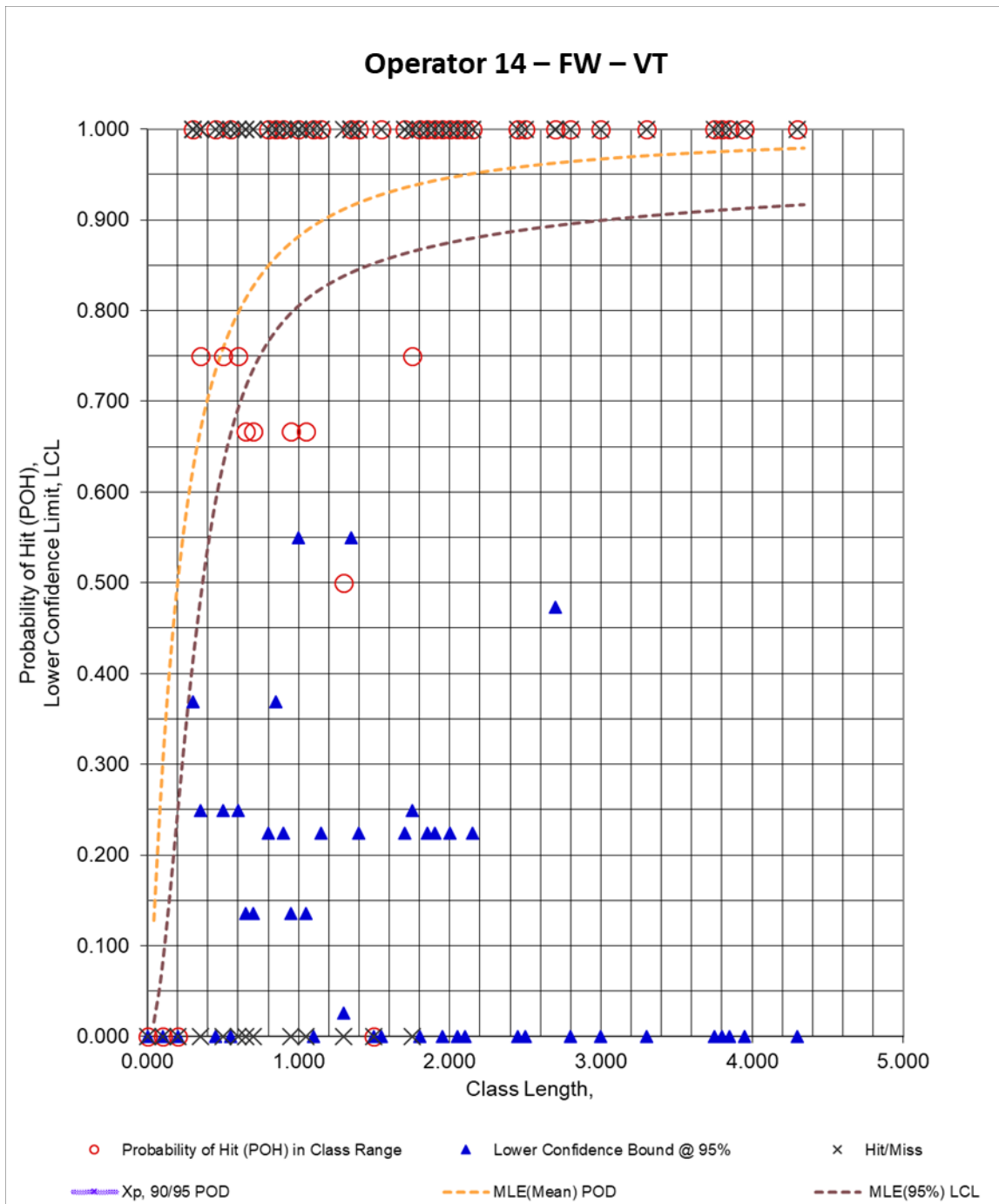


Figure 285. DOEPOD – FW – VT – Operator 14

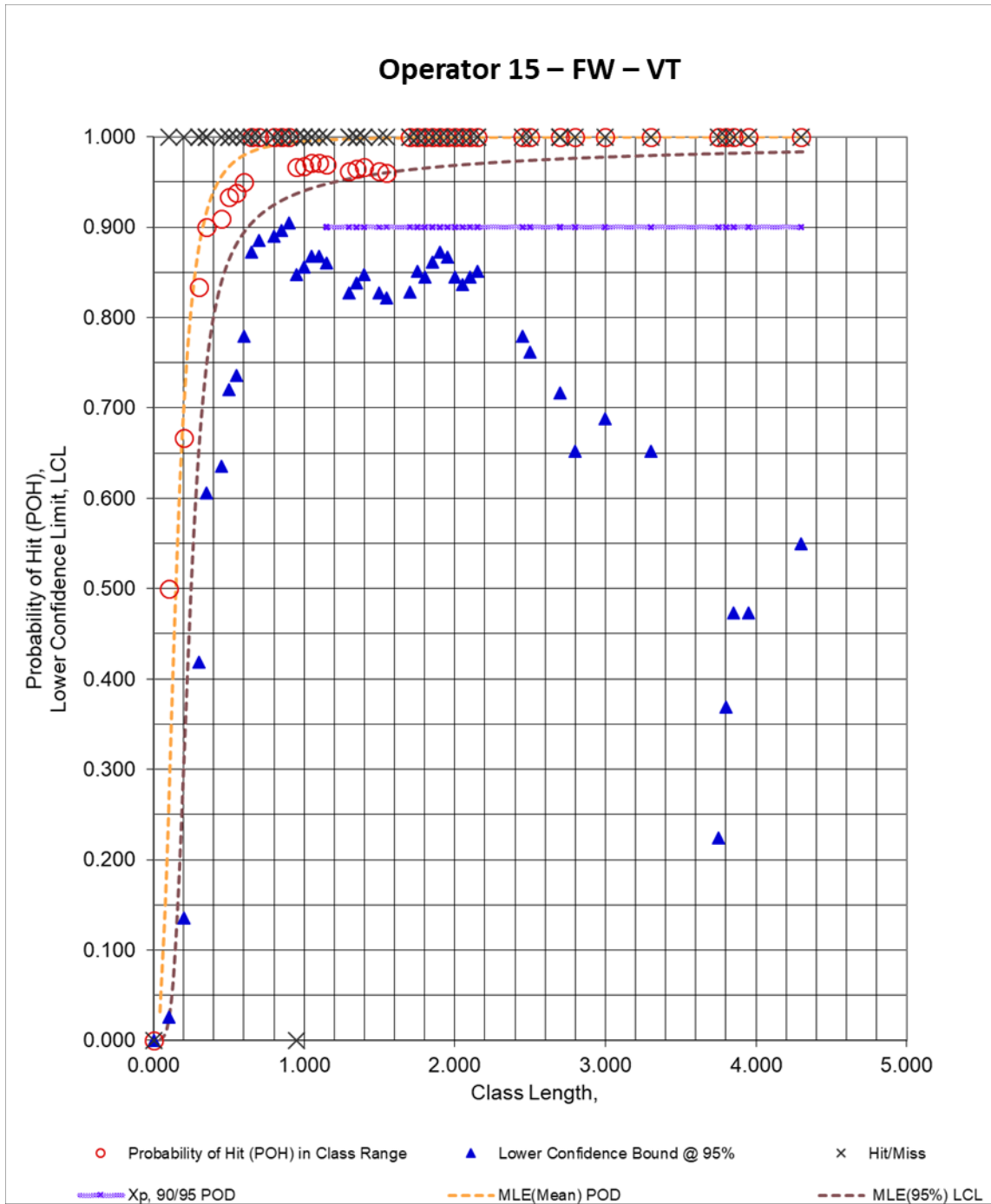


Figure 286. DOEPOD – FW – VT – Operator 15

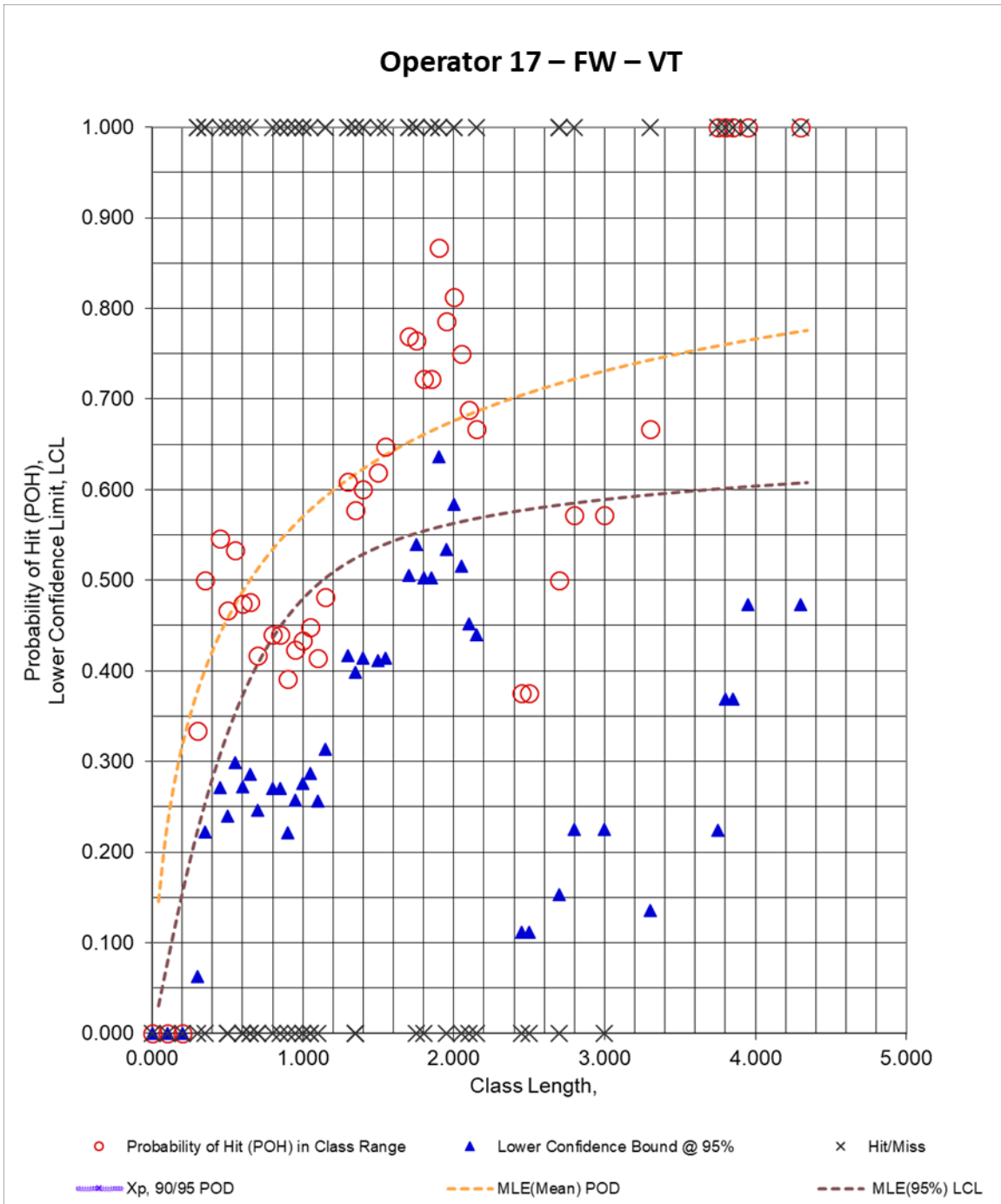


Figure 287. DOEPOD – FW – VT – Operator 17

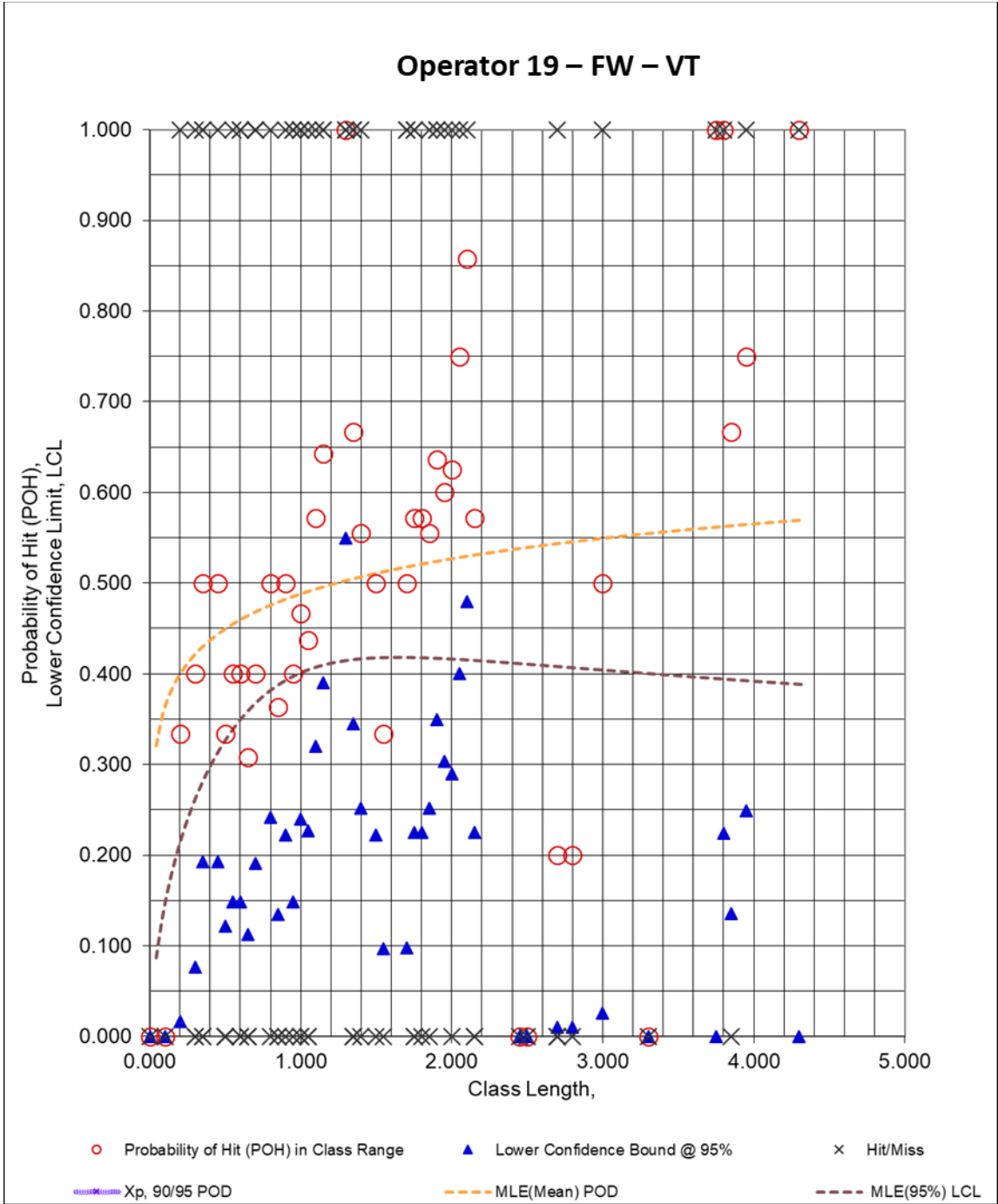


Figure 288. DOEPOD – FW – VT – Operator 19

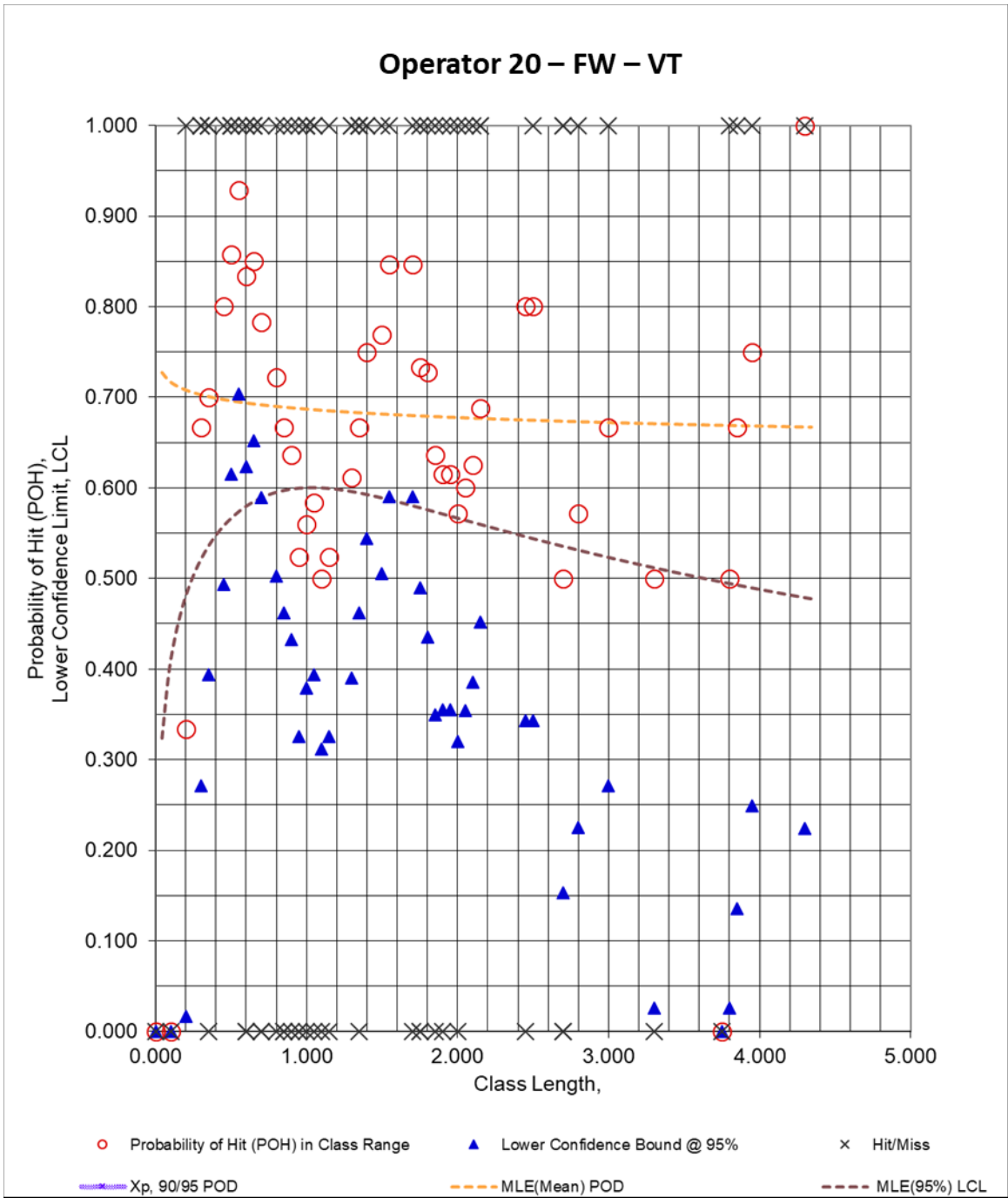


Figure 289. DOEPOD – FW – VT – Operator 20

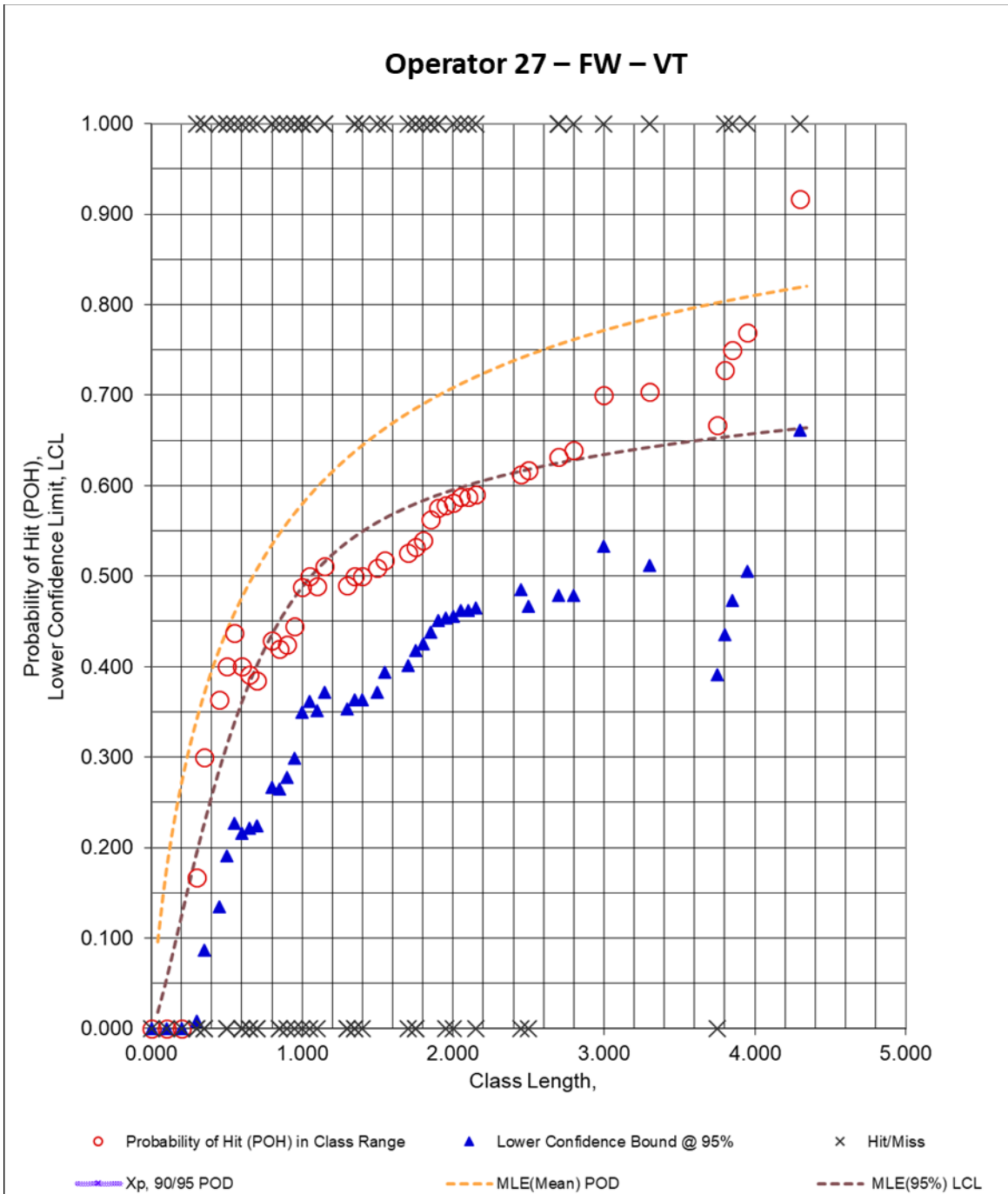


Figure 290. DOEPOD – FW – VT – Operator 27

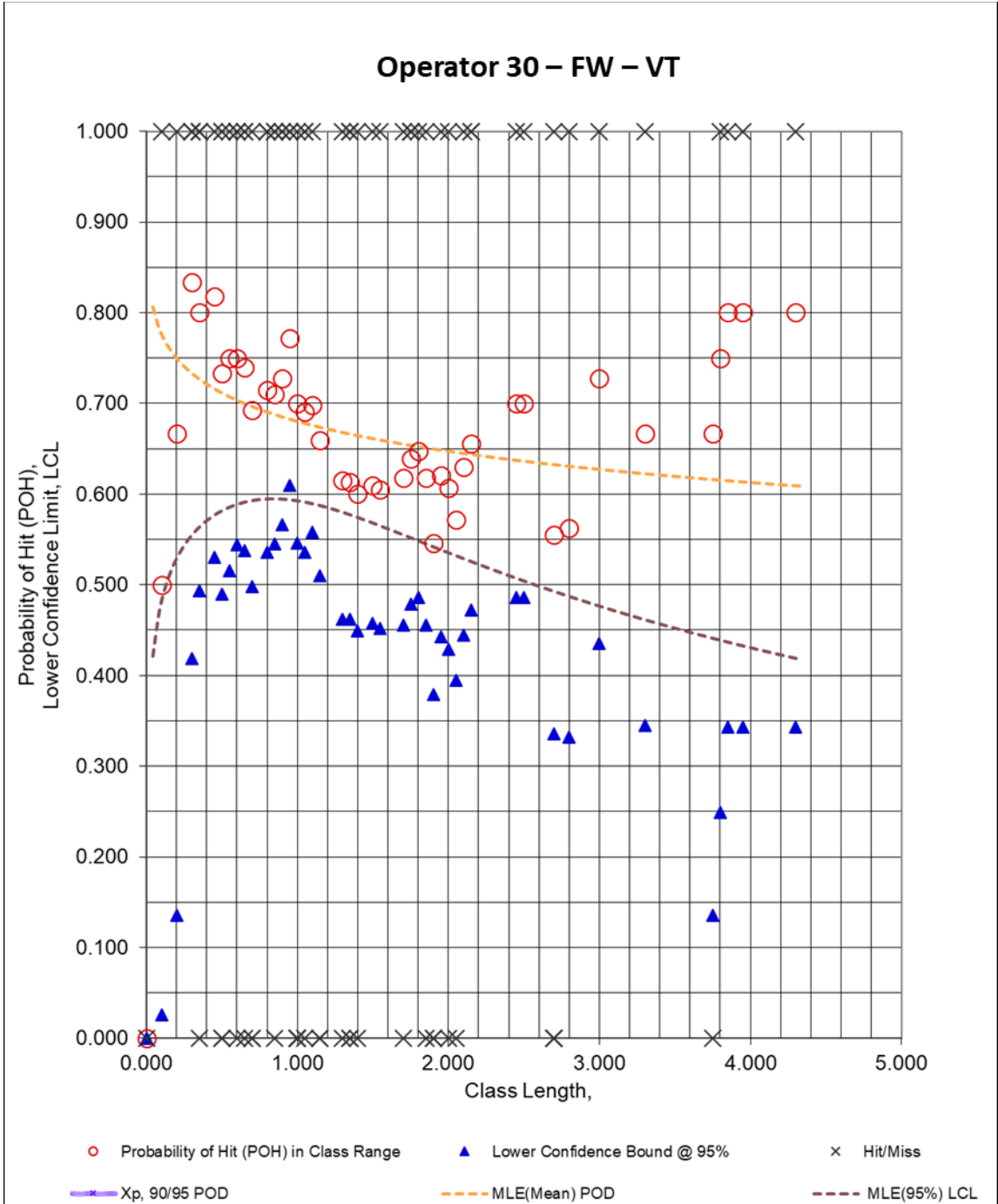


Figure 291. DOEPOD – FW – VT – Operator 30

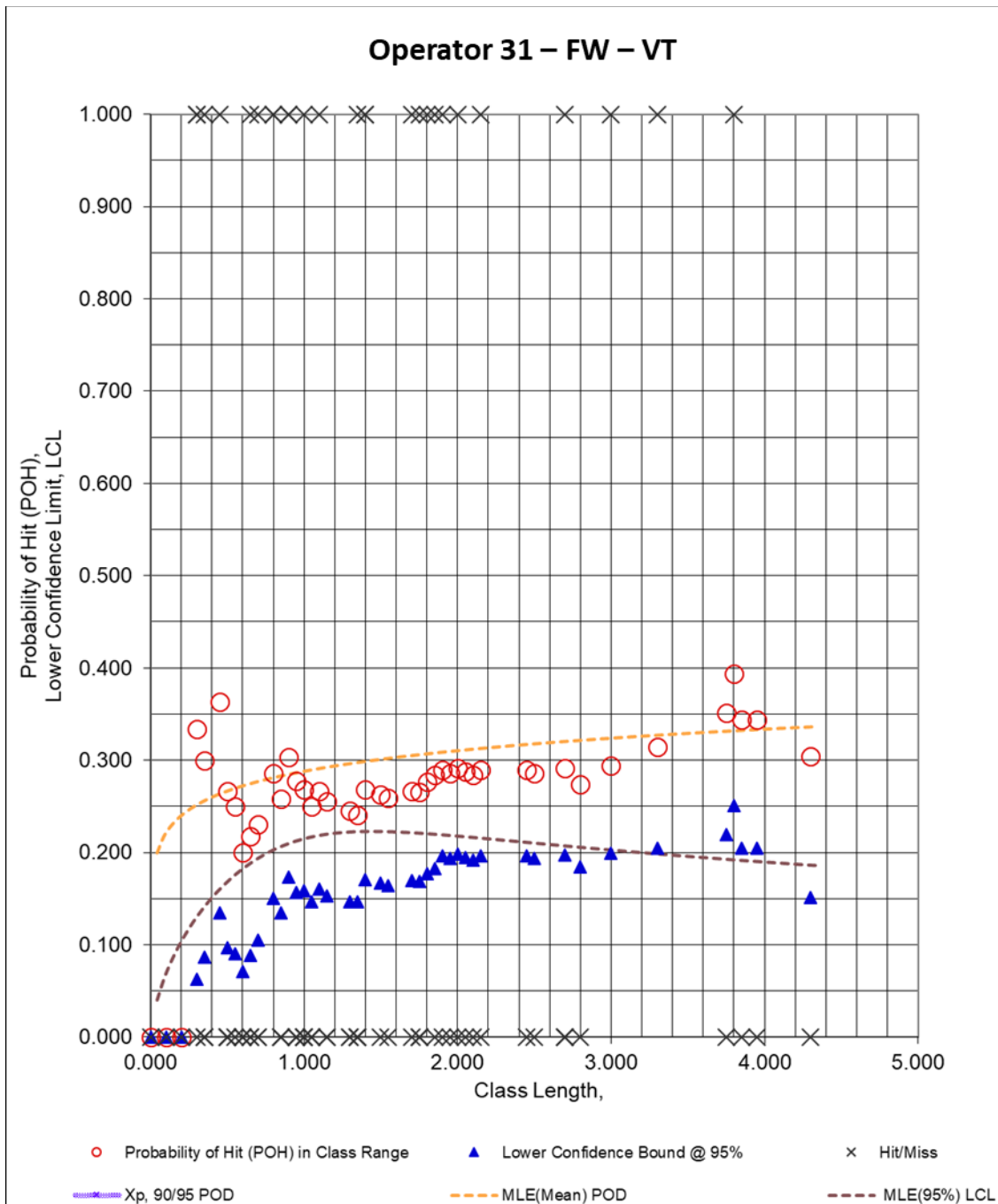


Figure 292. DOEPOD – FW – VT – Operator 31

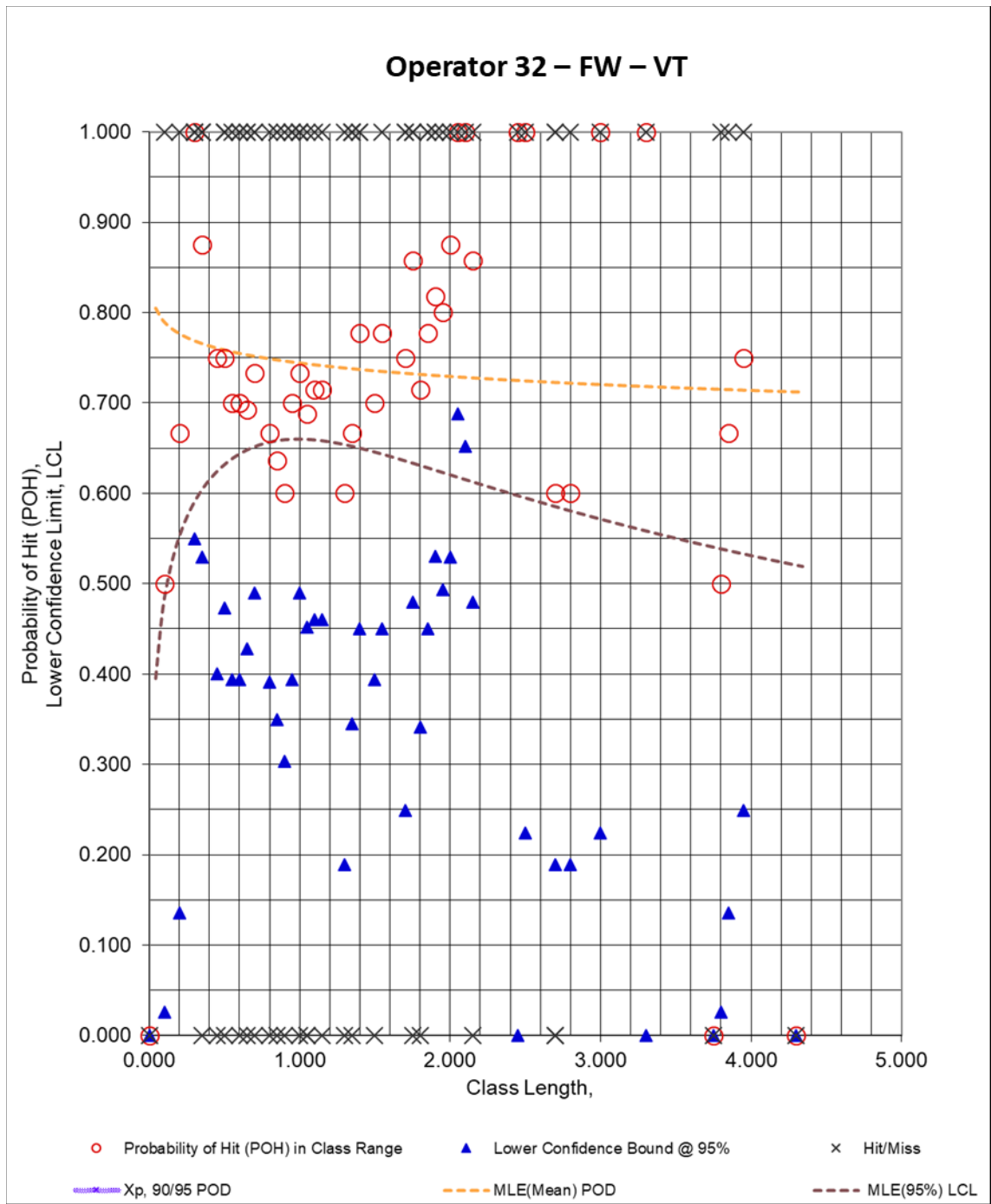


Figure 293. DOEPOD – FW – VT – Operator 32

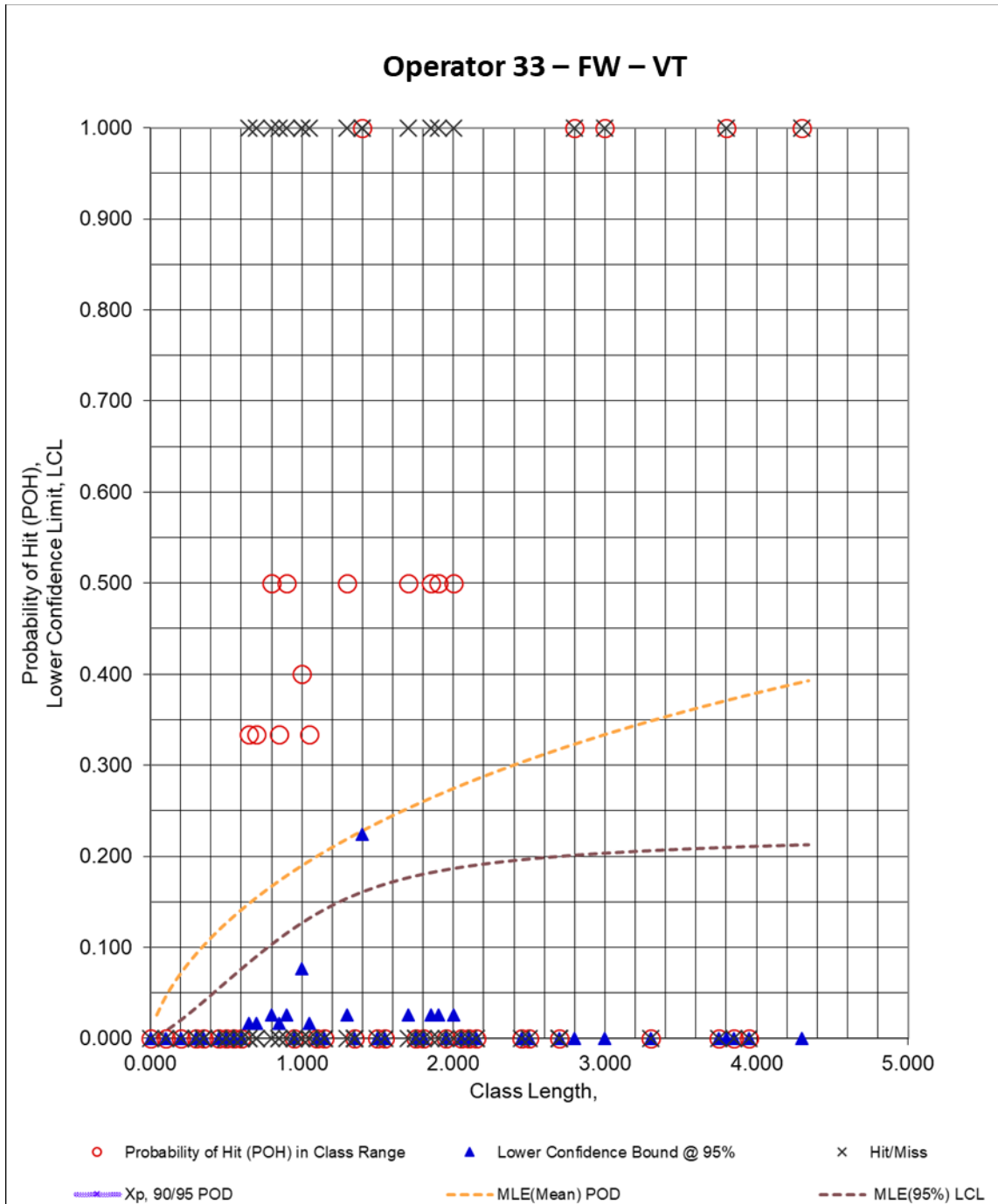


Figure 294. DOEPOD – FW – VT – Operator 33

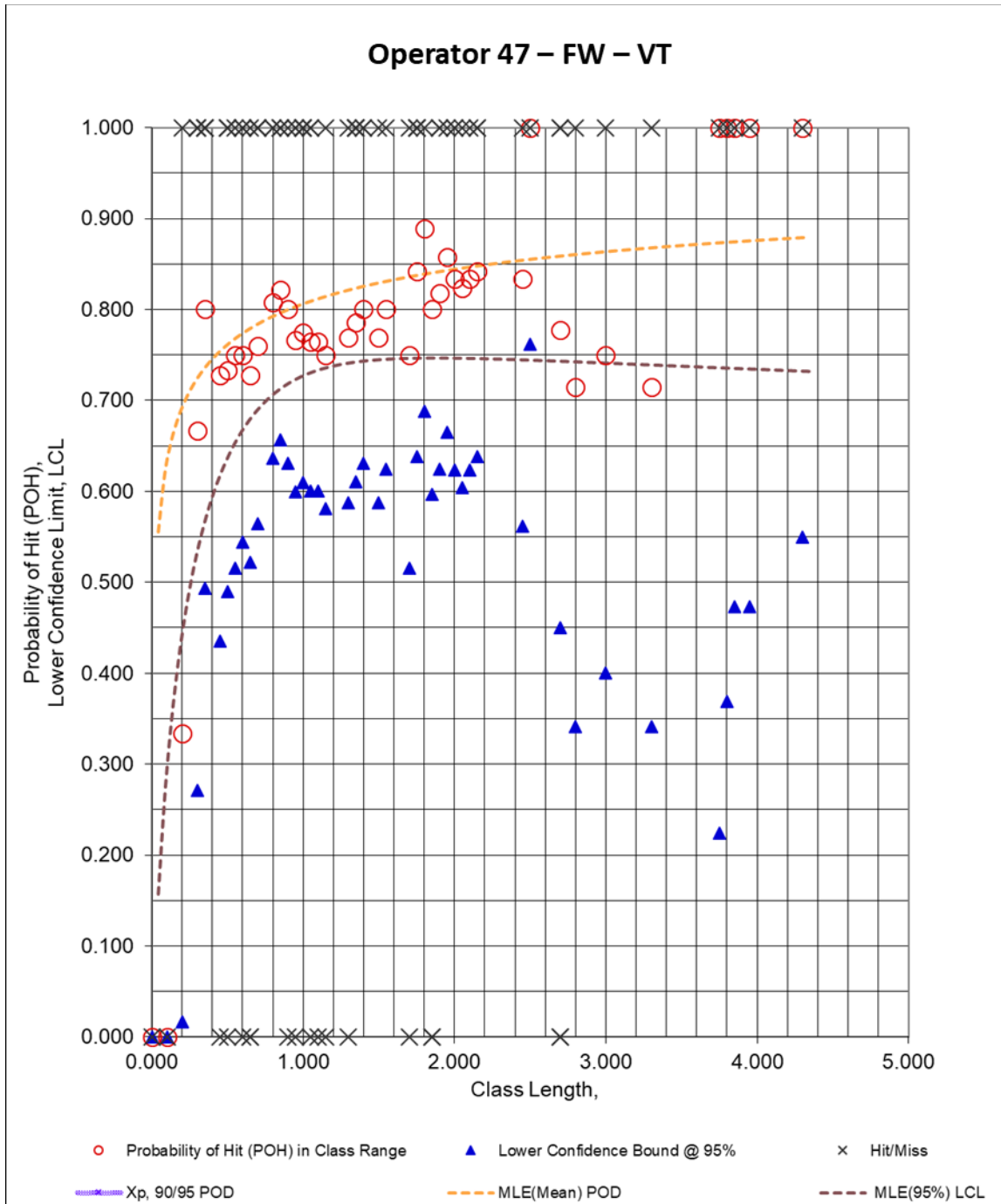


Figure 295. DOEPOD – FW – VT – Operator 47

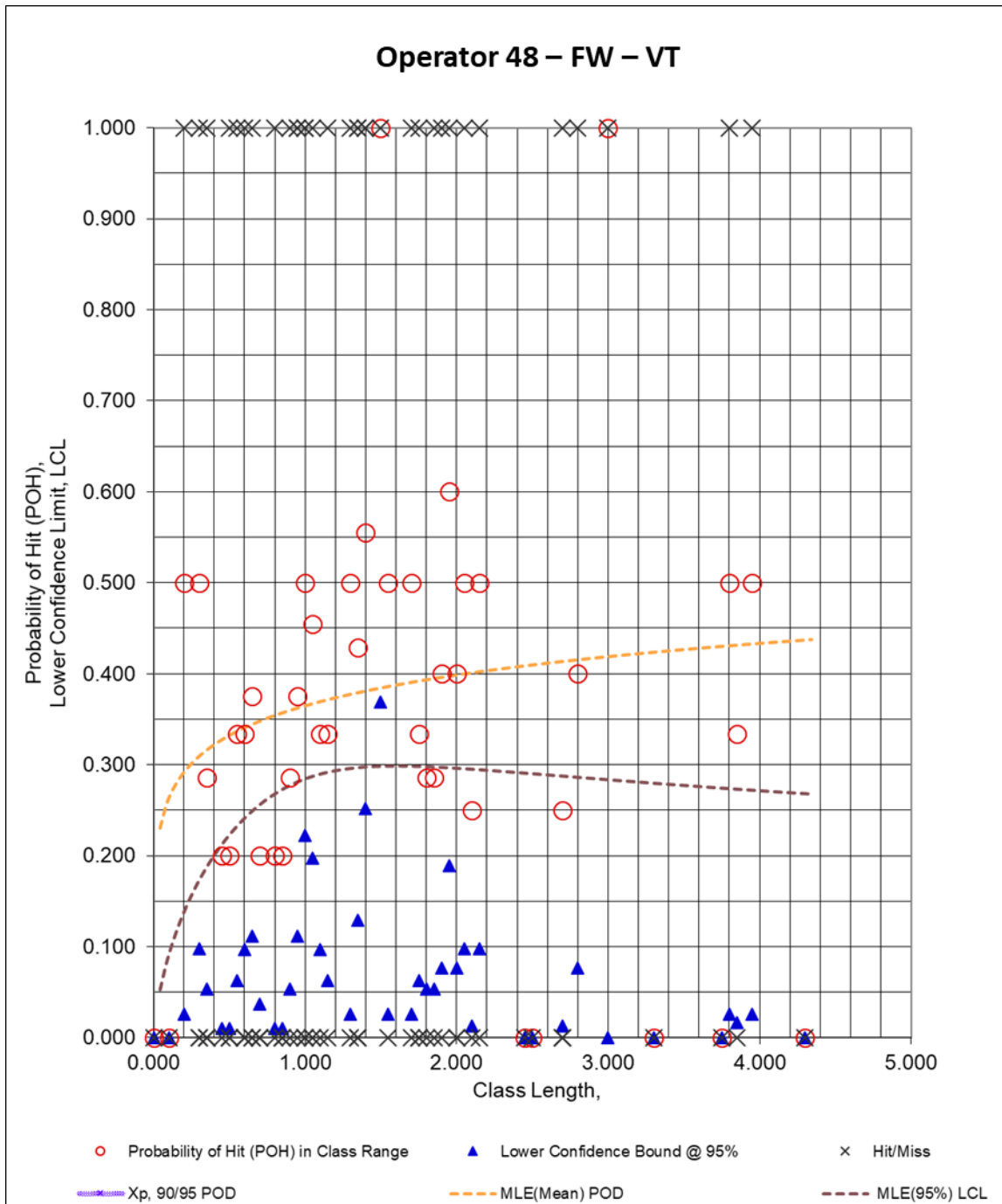


Figure 296. DOEPOD – FW – VT – Operator 48

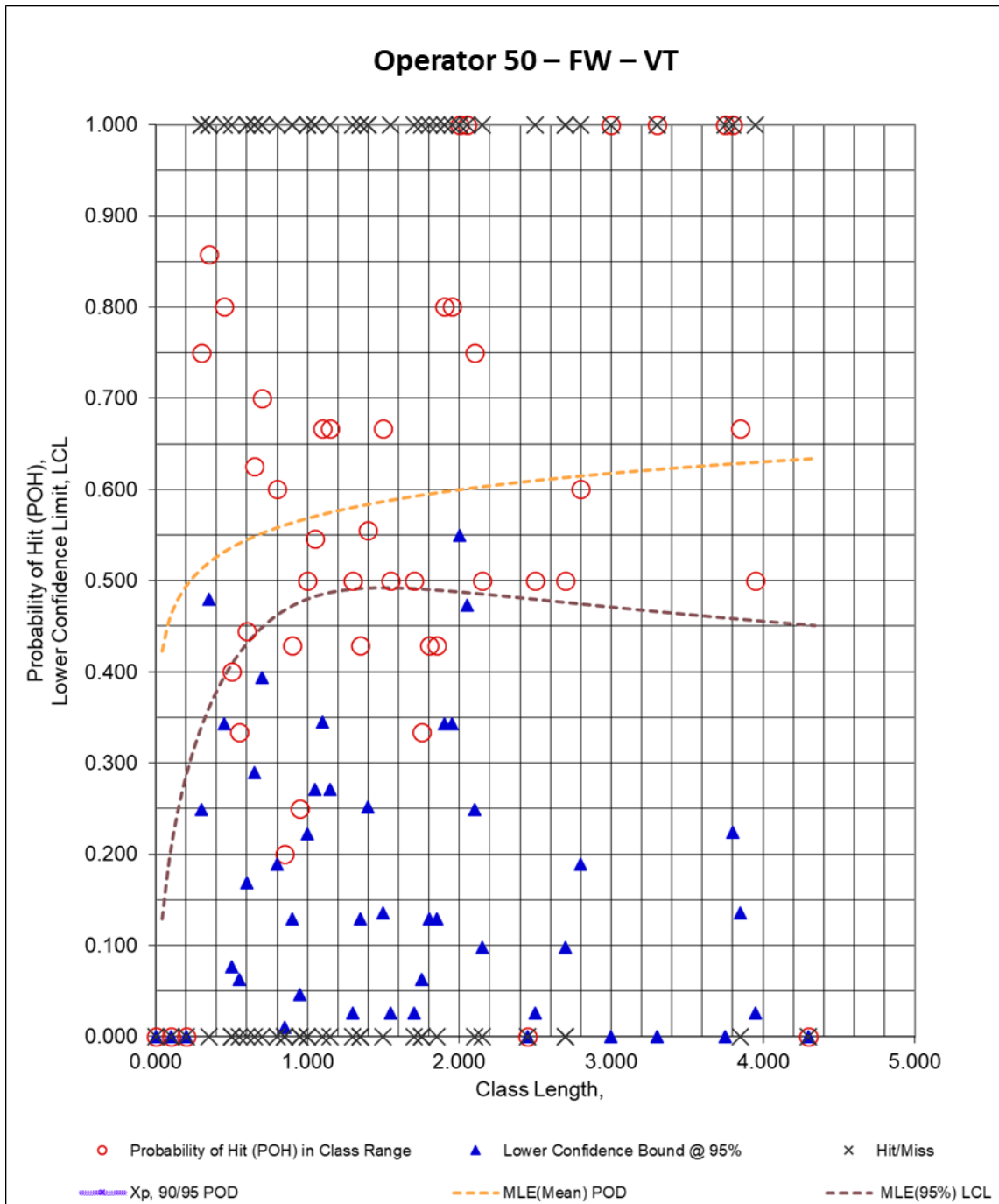


Figure 297. DOEPOD – FW – VT – Operator 50

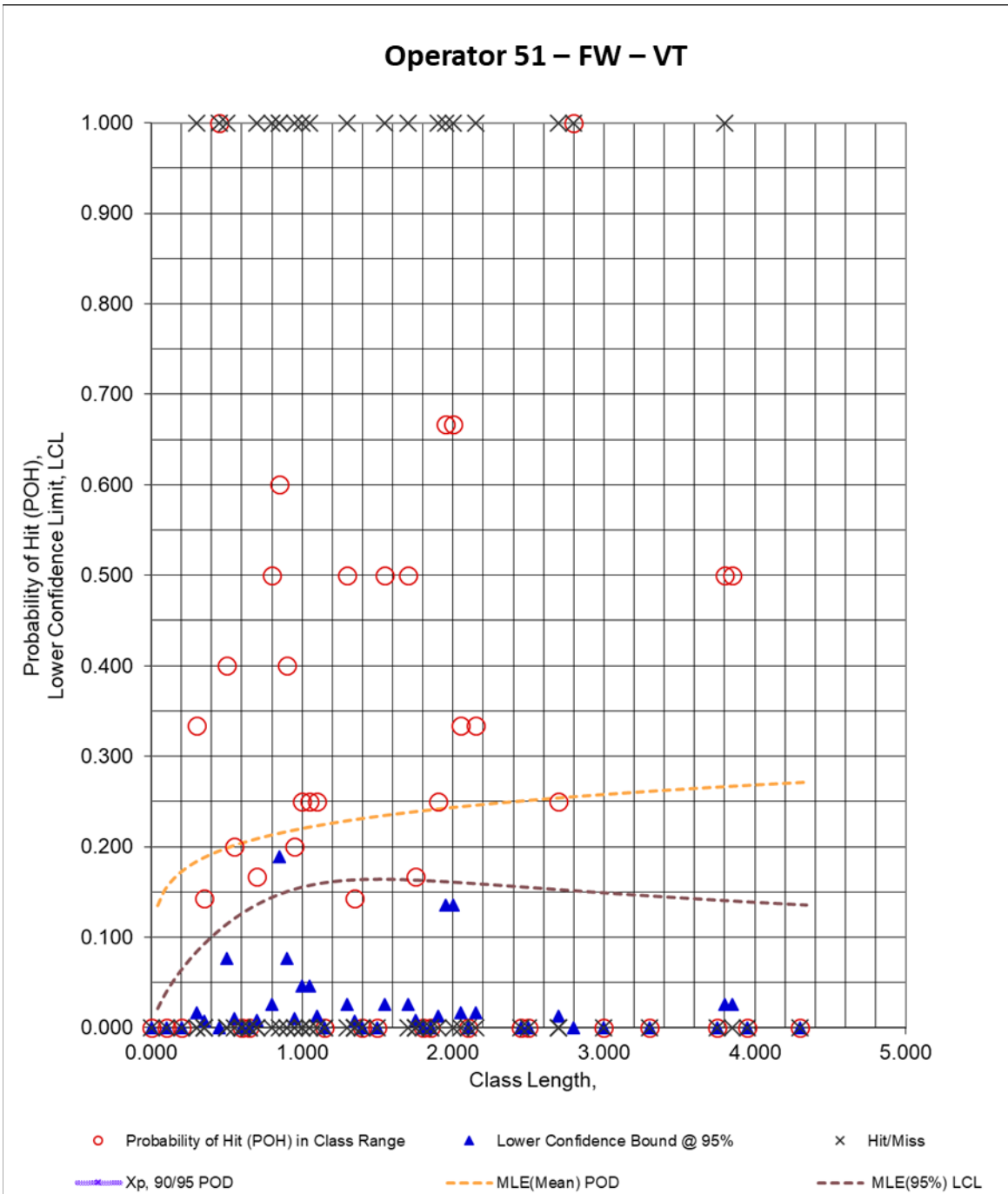


Figure 298. DOEPOD – FW – VT – Operator 51

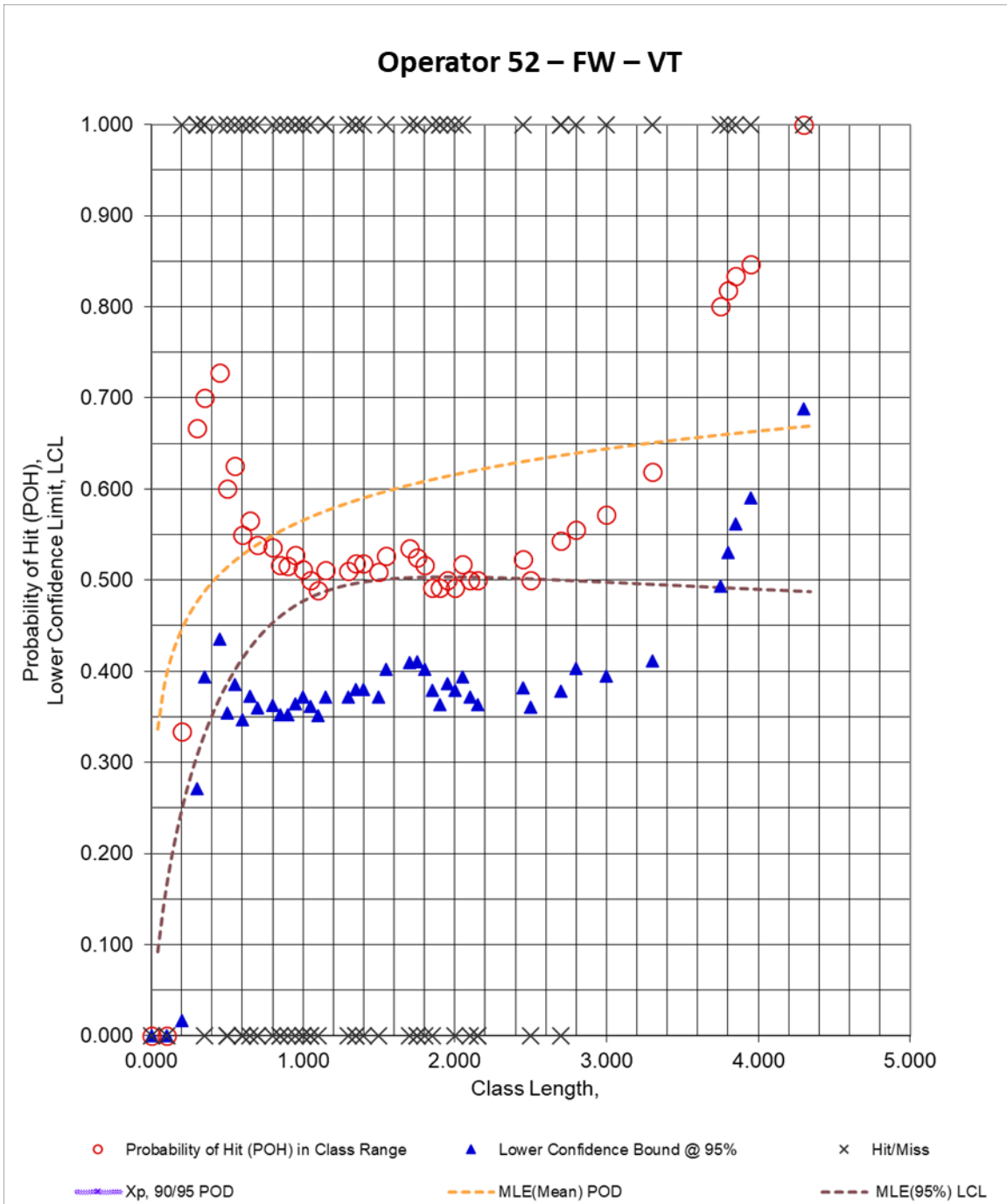


Figure 299. DOEPOD – FW – VT – Operator 52

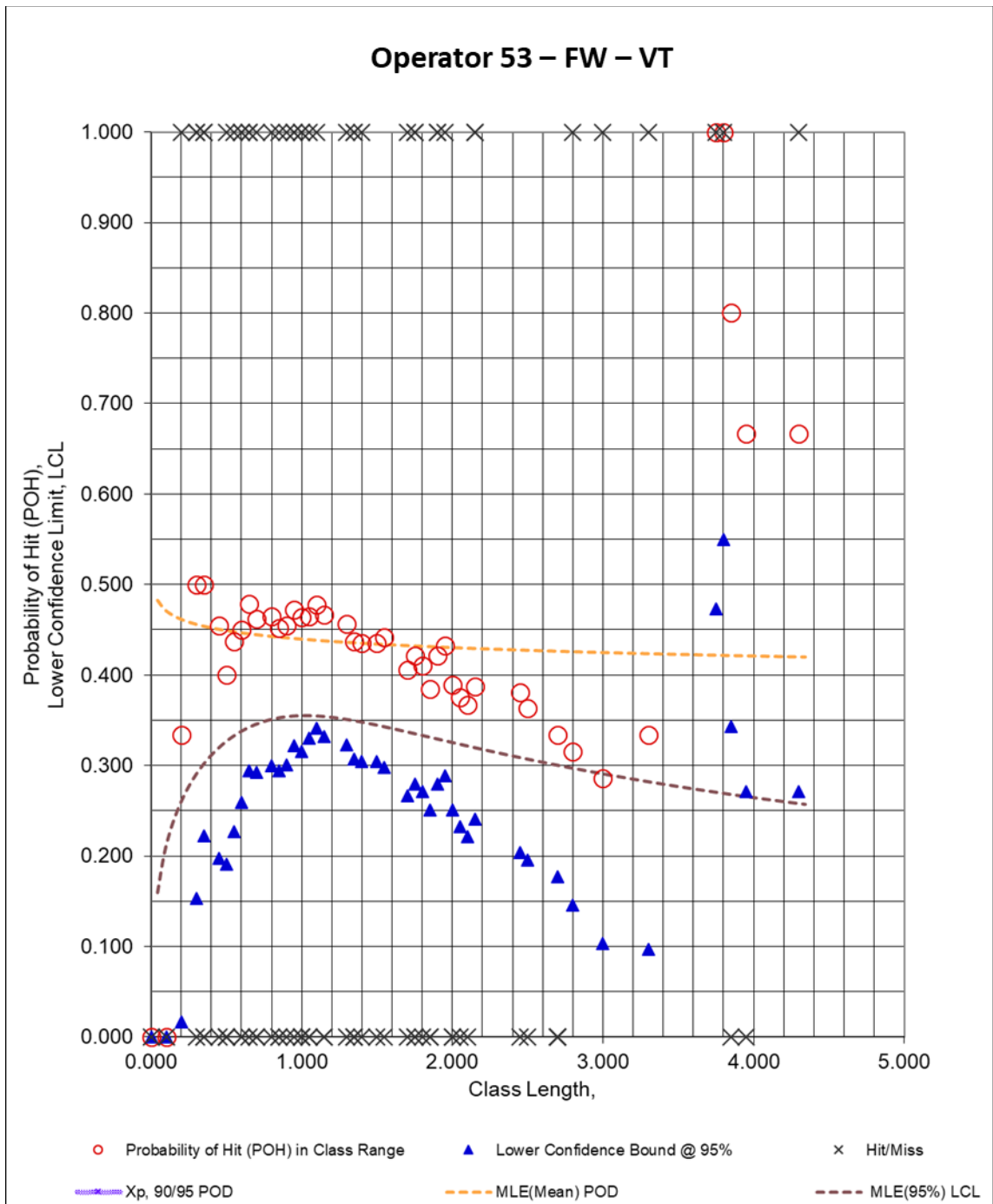


Figure 300. DOEPOD – FW – VT – Operator 53

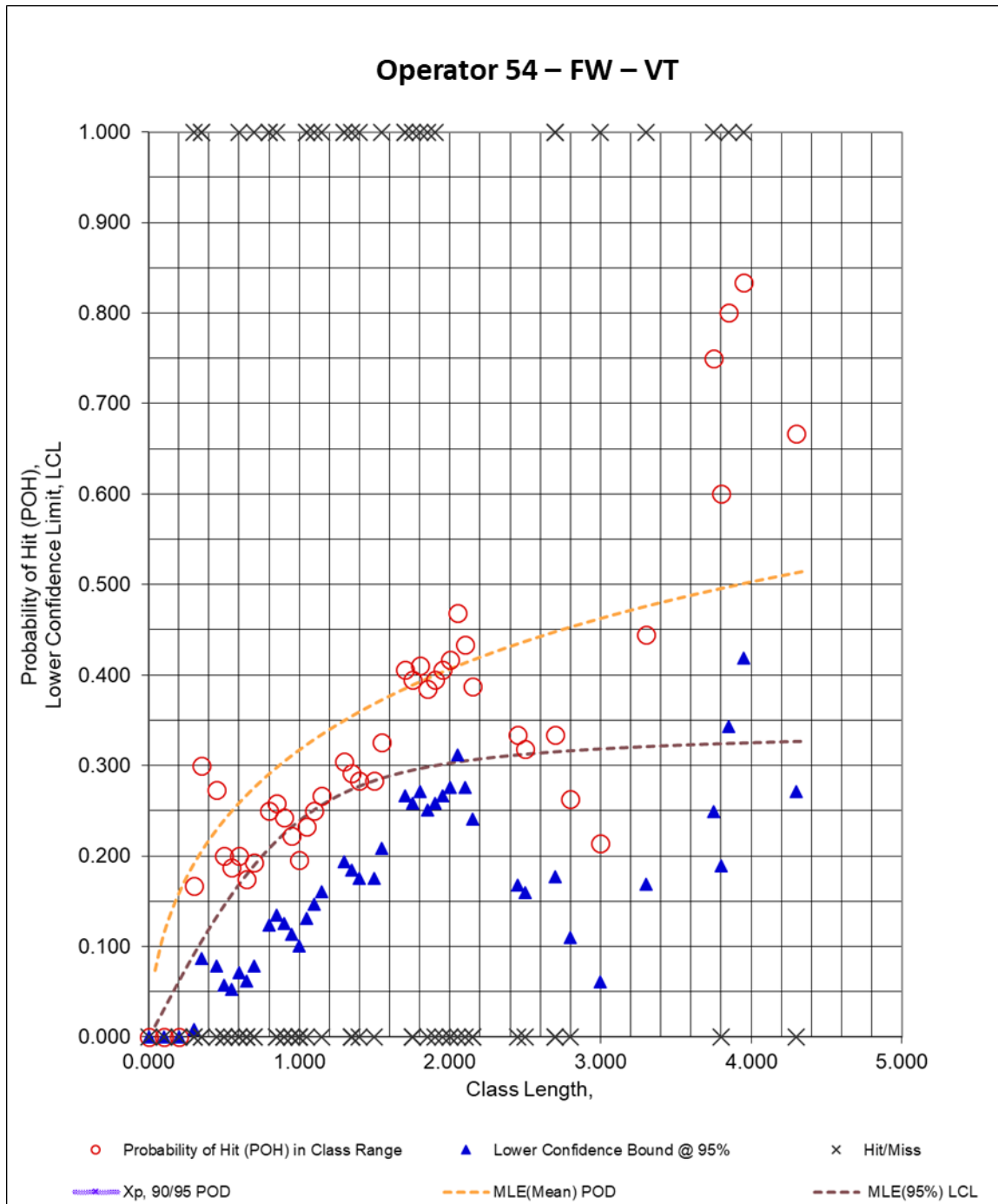


Figure 301. DOEPOD – FW – VT – Operator 54

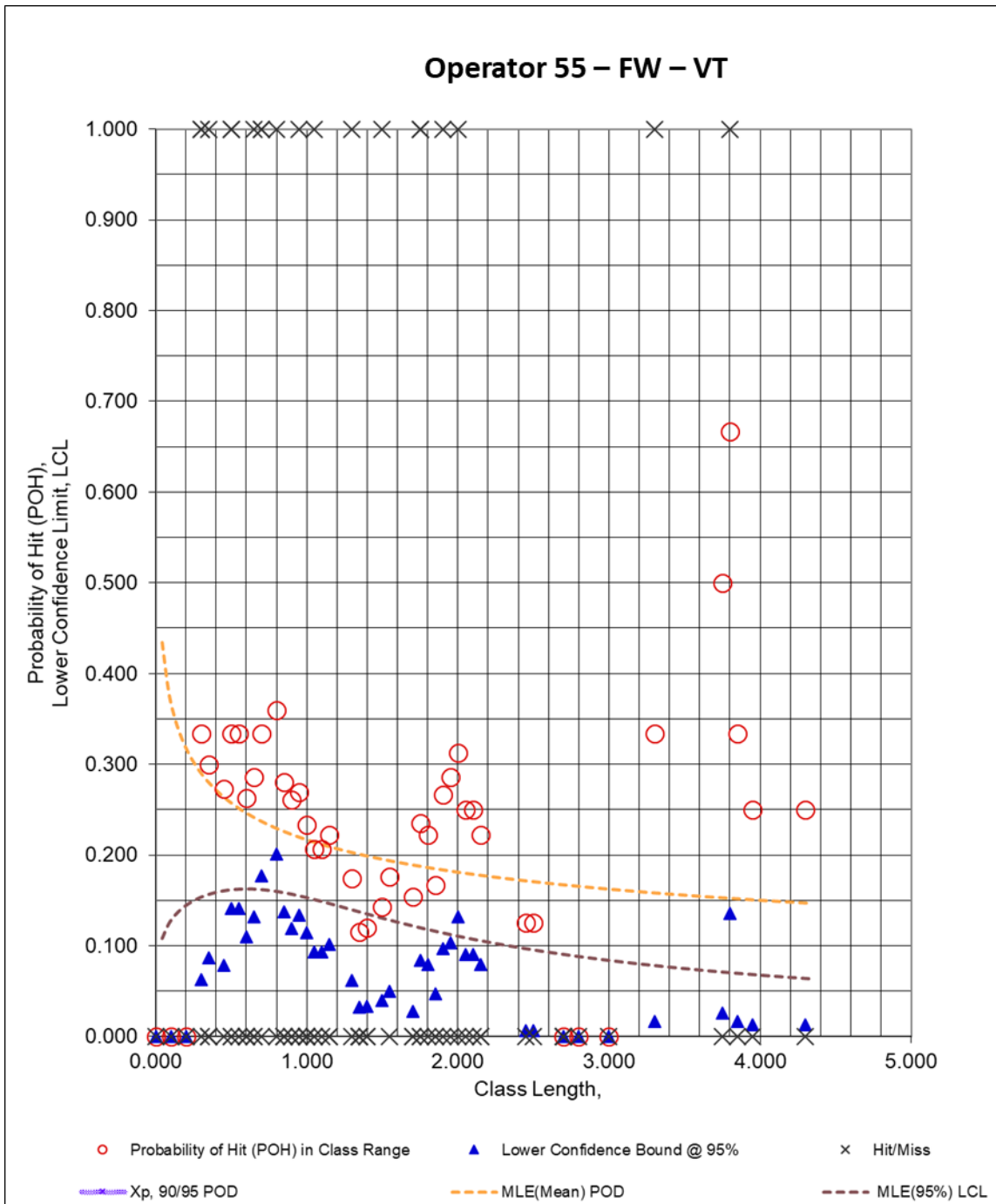


Figure 302. DOEPOD – FW – VT – Operator 55

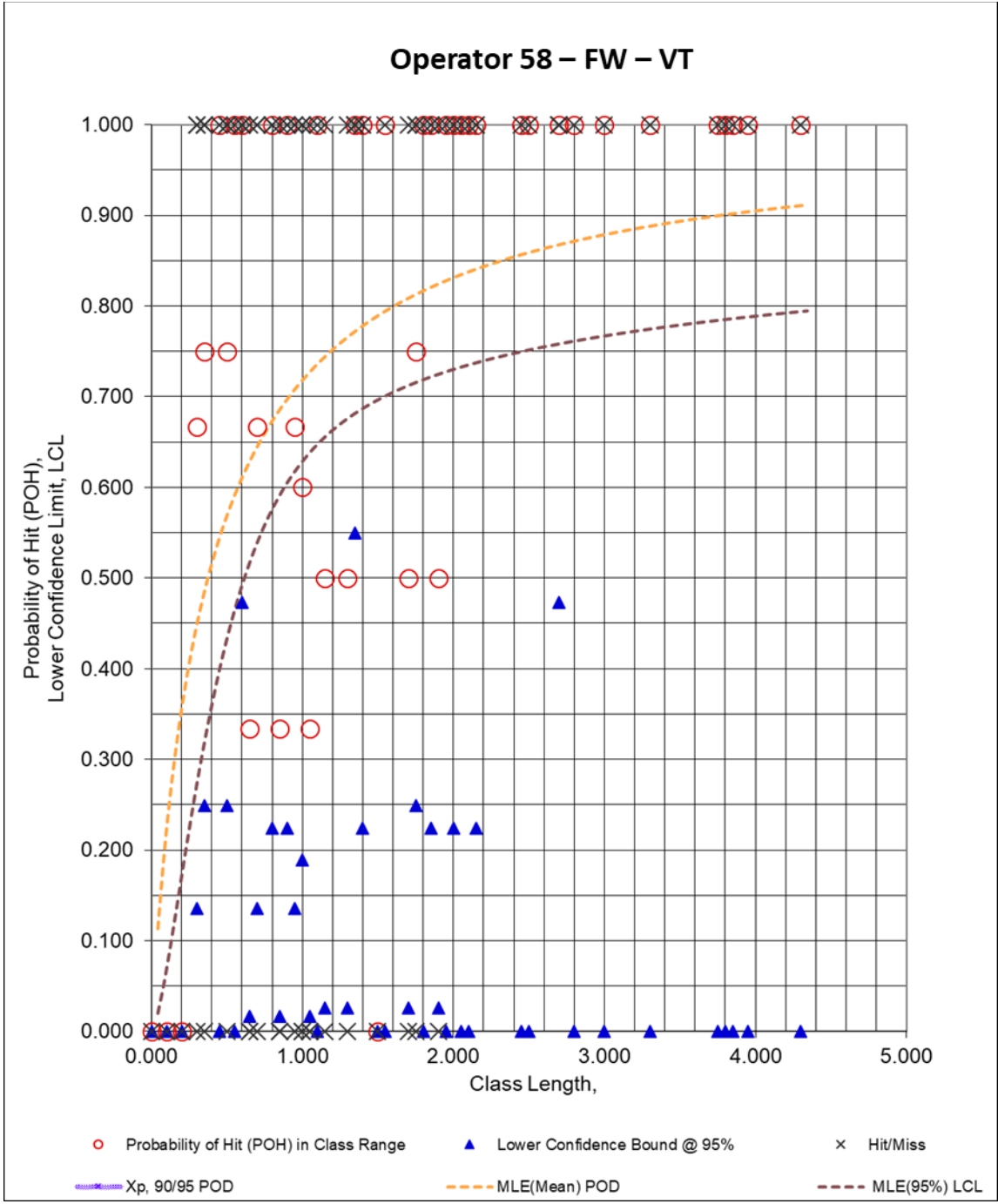


Figure 303. DOEPOD – FW – VT – Operator 58

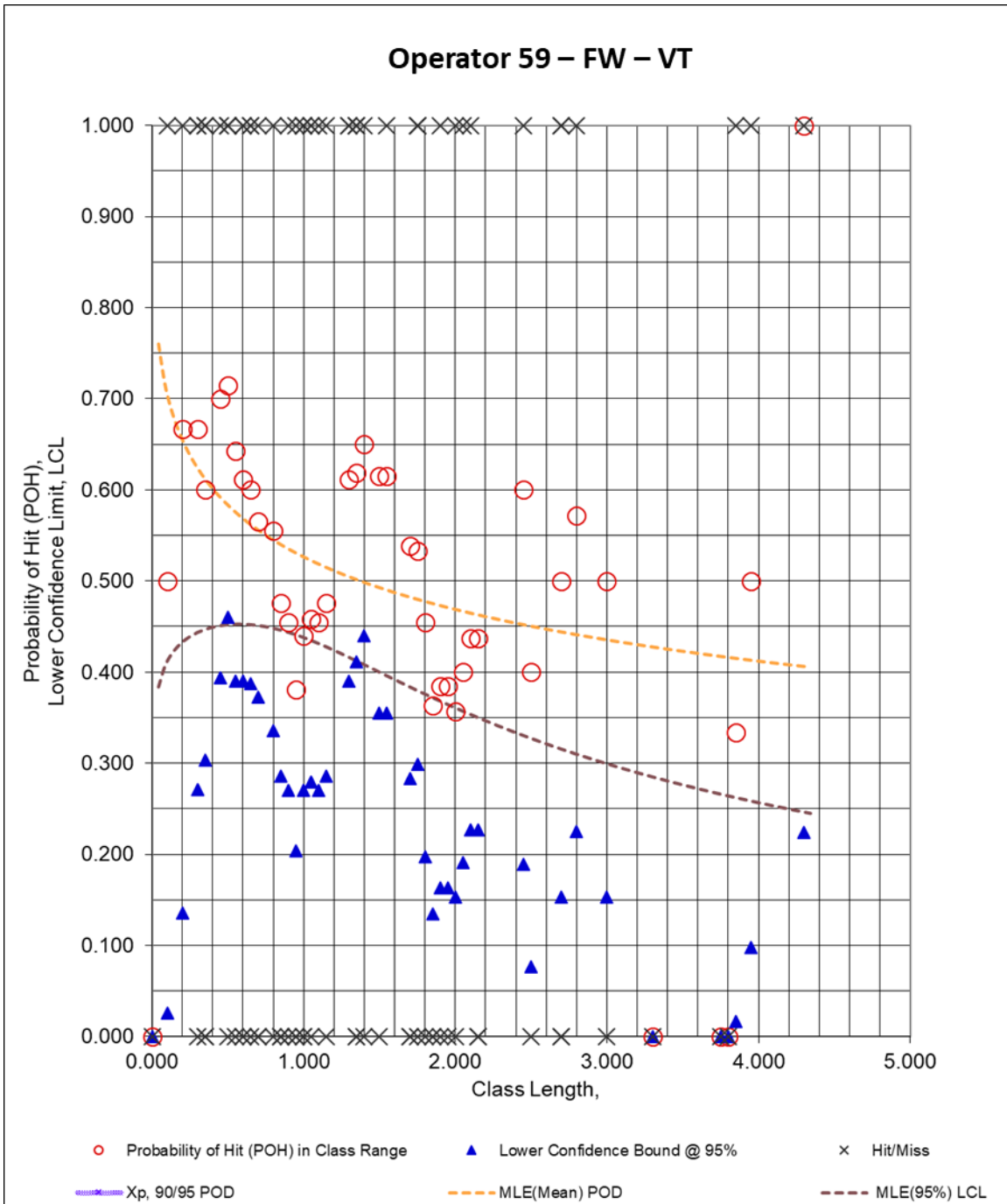


Figure 304. DOEPOD – FW – VT – Operator 59

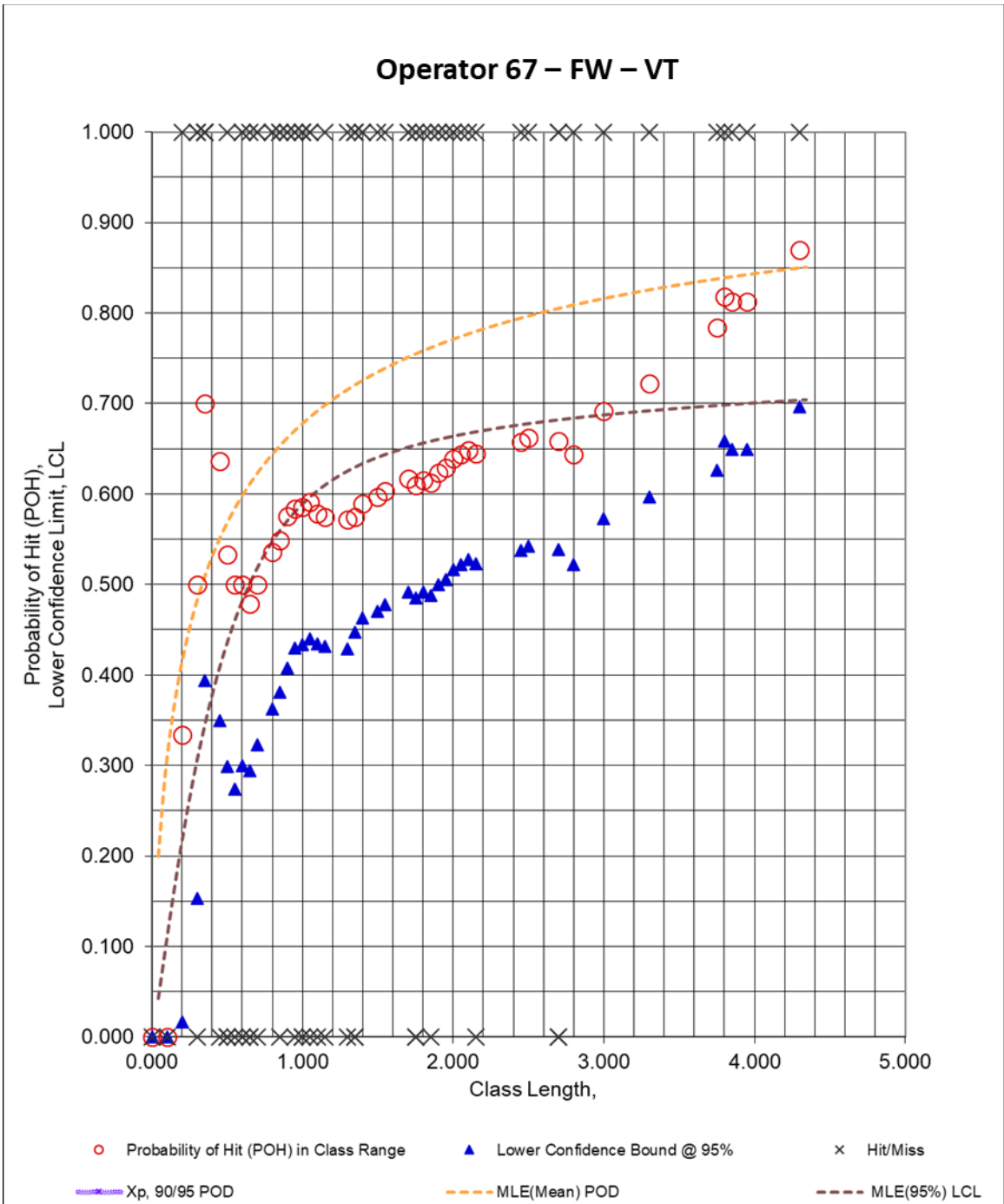


Figure 305. DOEPOD – FW – VT – Operator 67

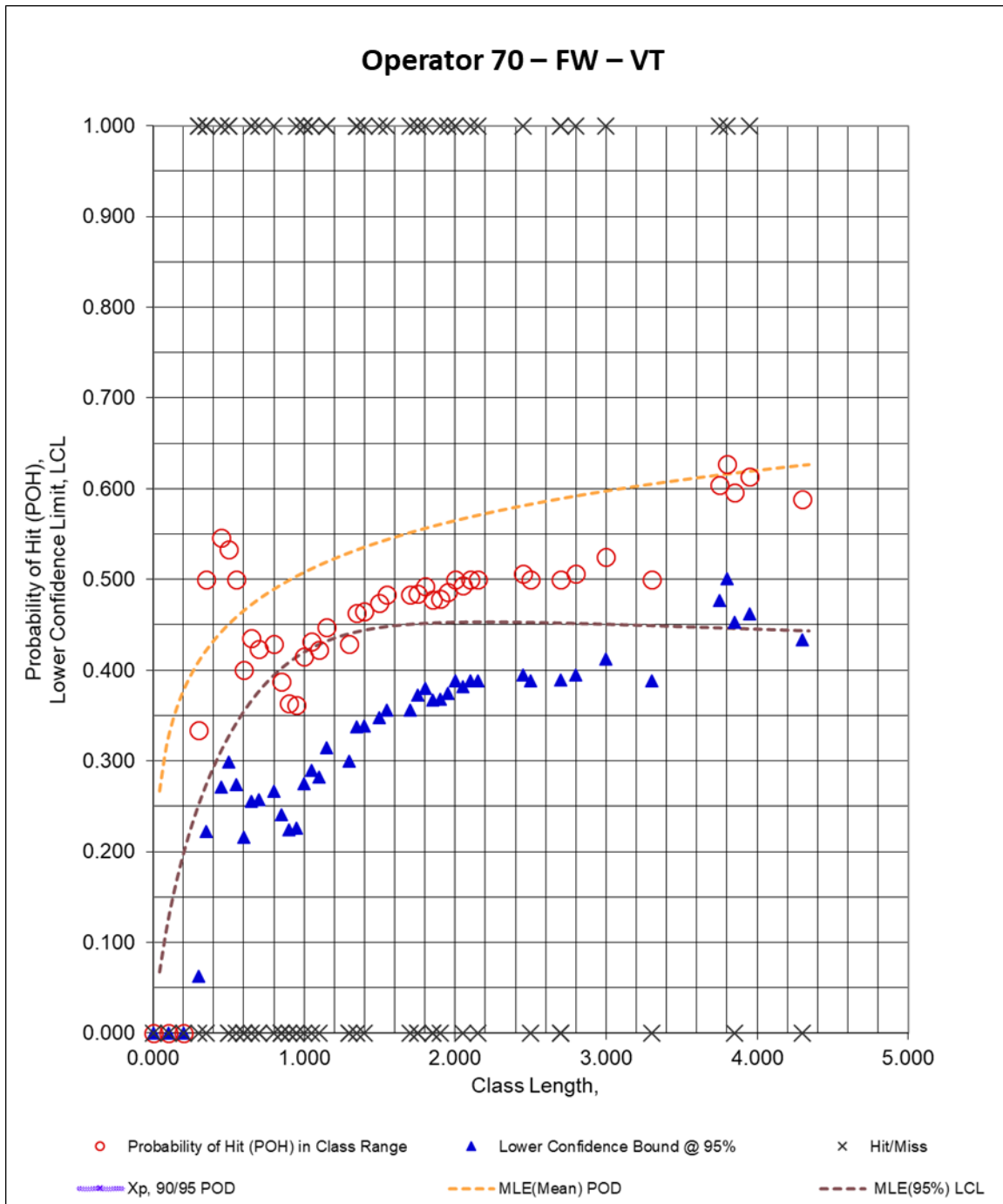


Figure 306. DOEPOD – FW – VT – Operator 70

Appendix F. DOEPOD Plots – Butt Welds

This appendix illustrates DOEPOD plot-butt welds in [Figure 307](#) through [Figure 410](#).

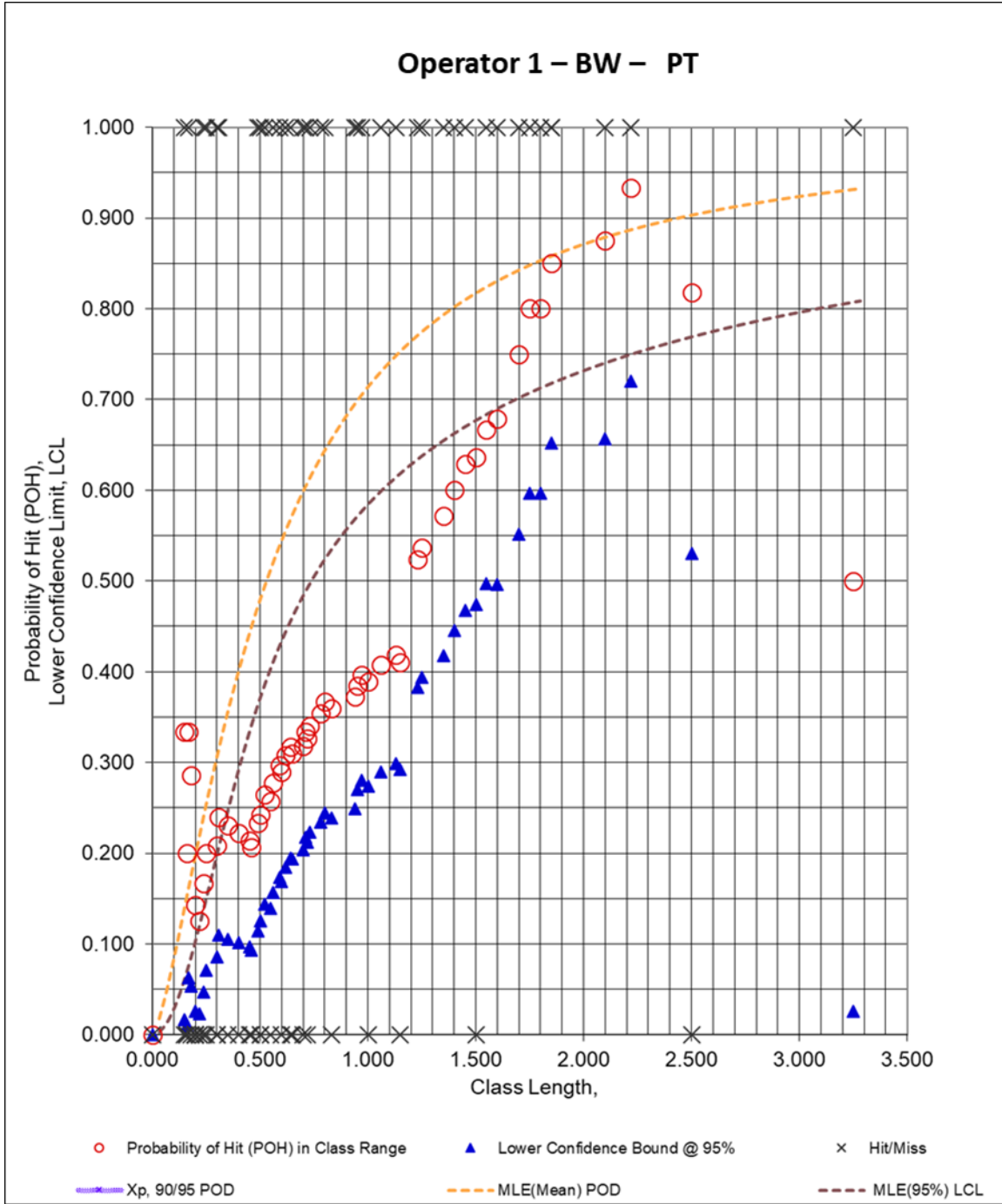


Figure 307. DOEPOD – BW – PT – Operator 1

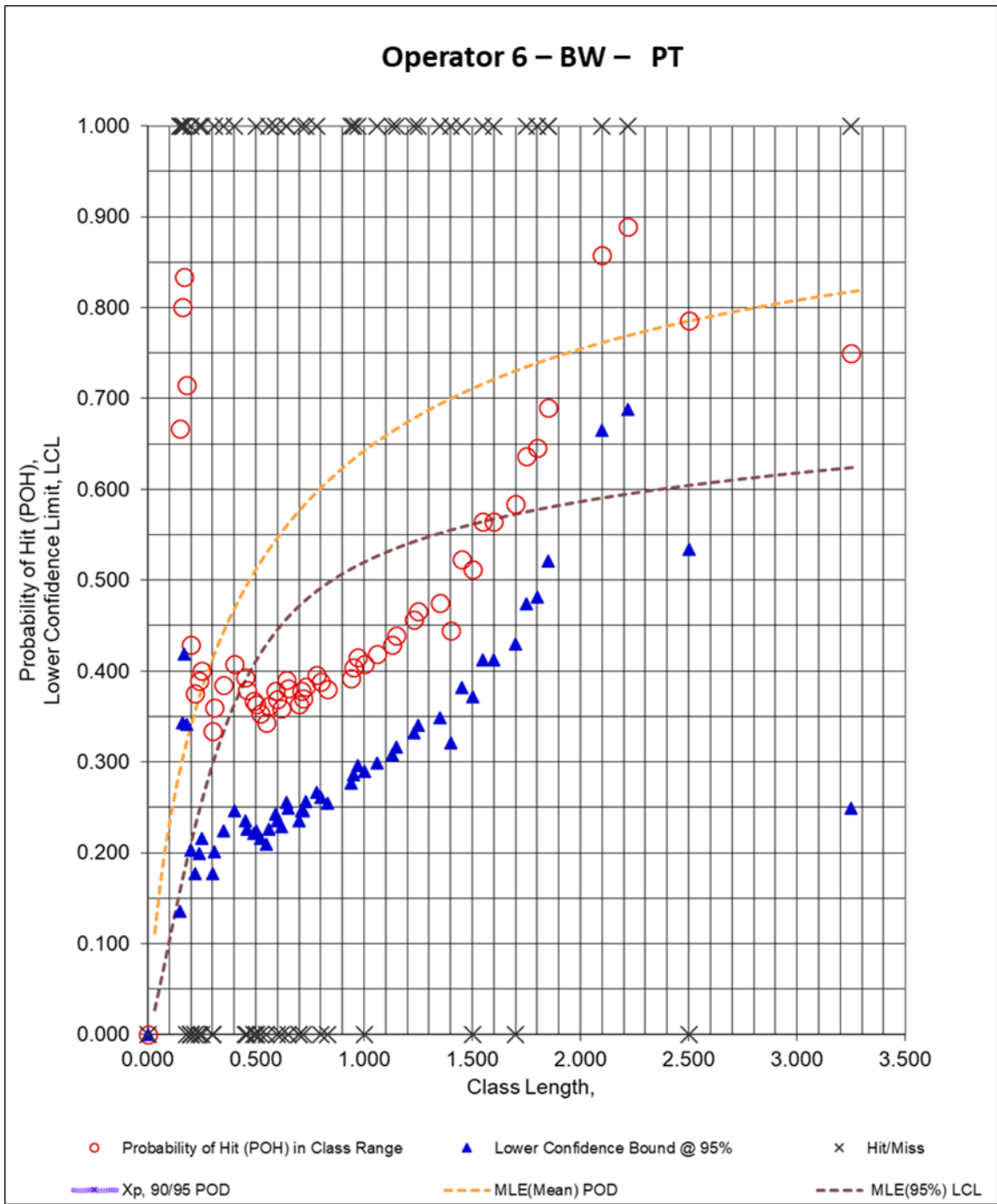


Figure 308. DOEPOD – BW – PT – Operator 6

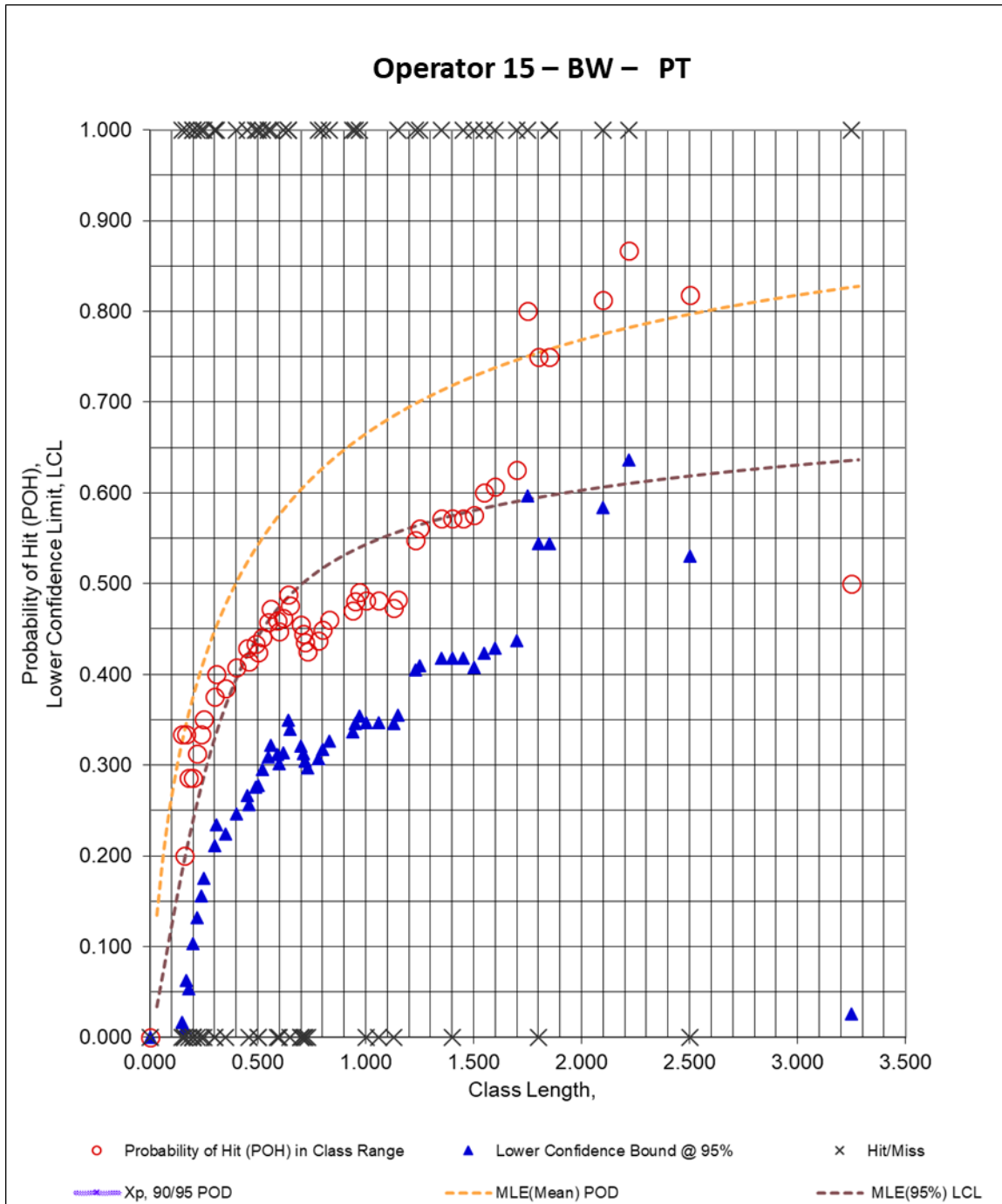


Figure 309. DOEPOD – BW – PT – Operator 15

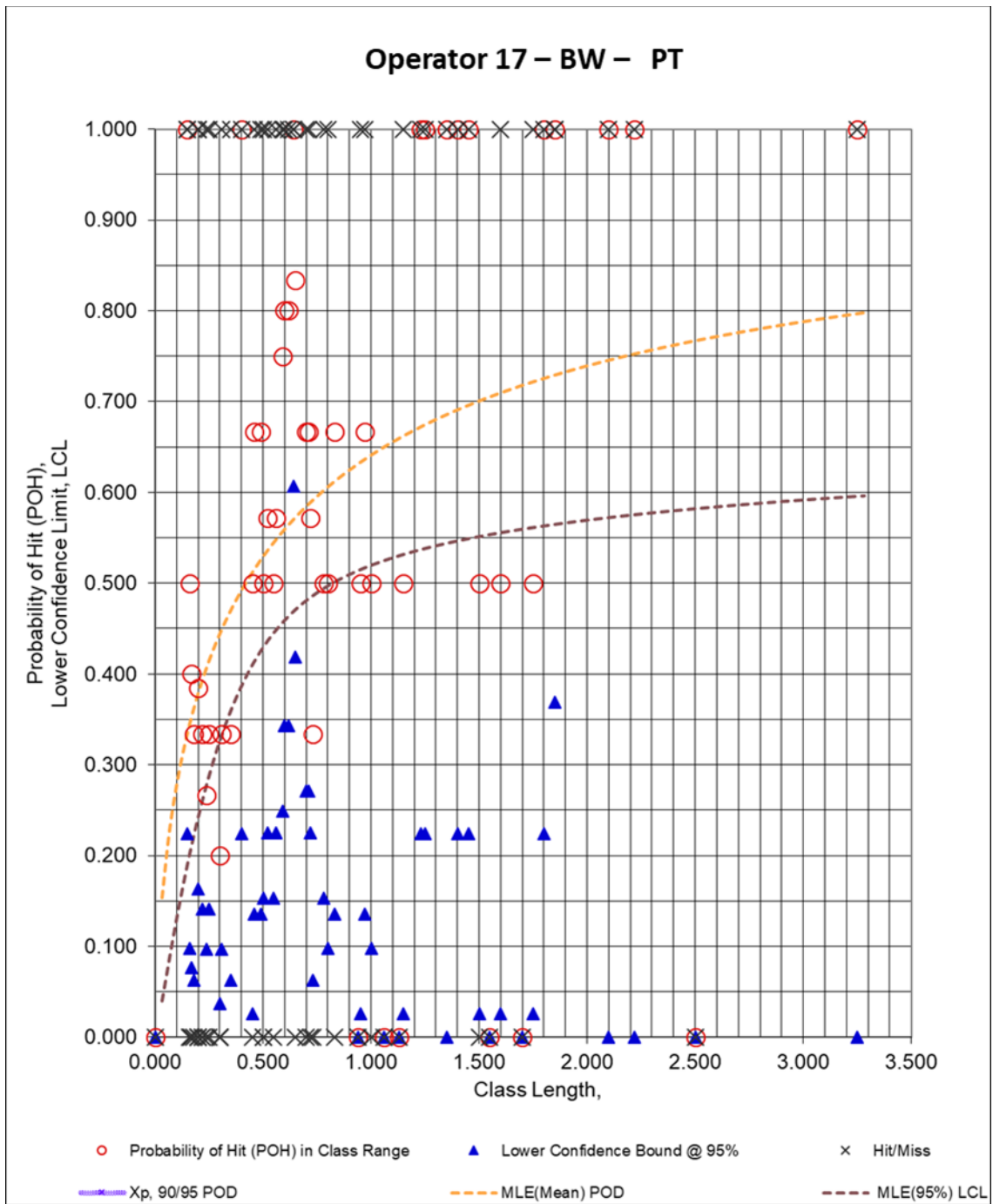


Figure 310. DOEPOD – BW – PT – Operator 17

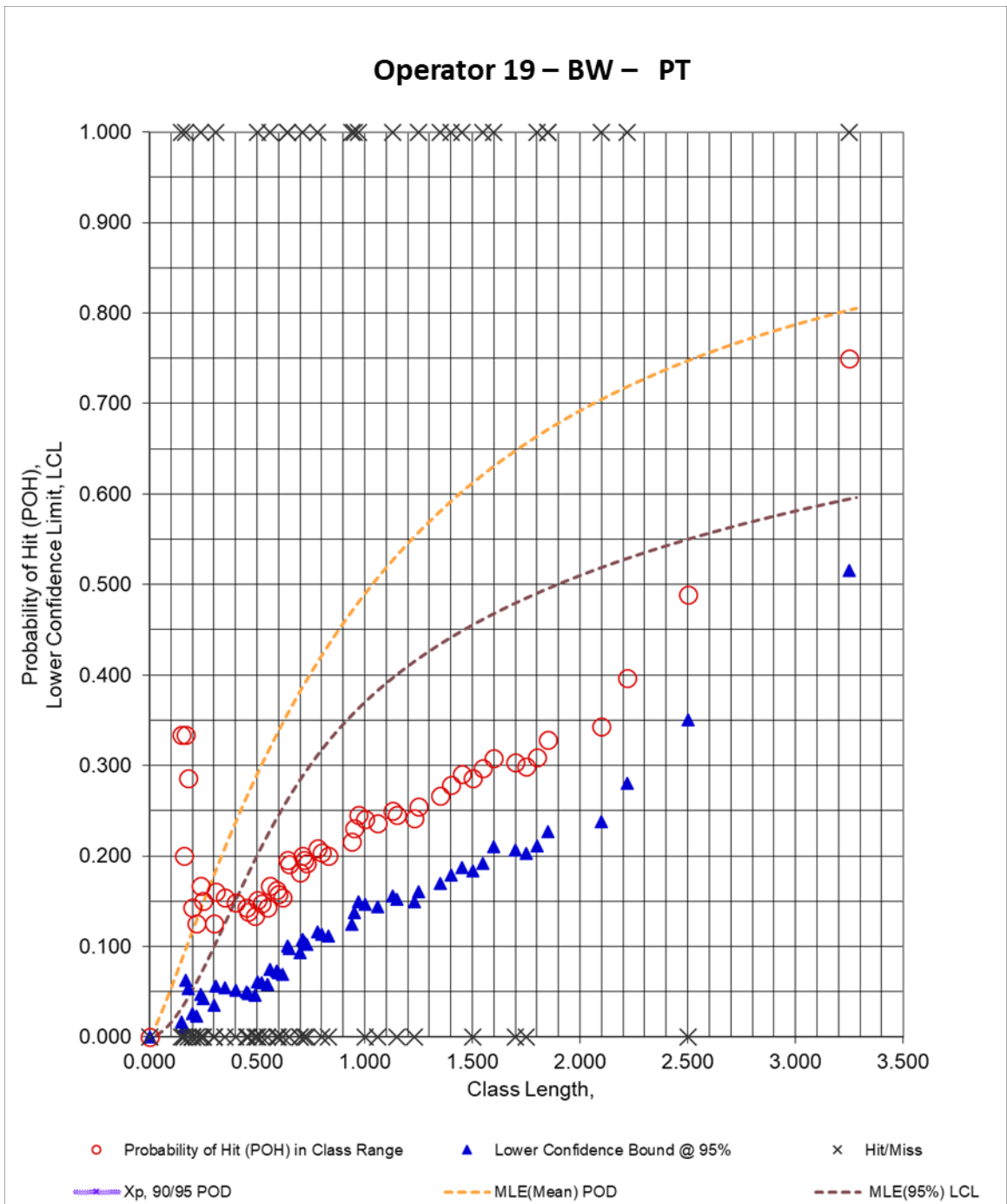


Figure 311. DOEPOD – BW – PT – Operator 19

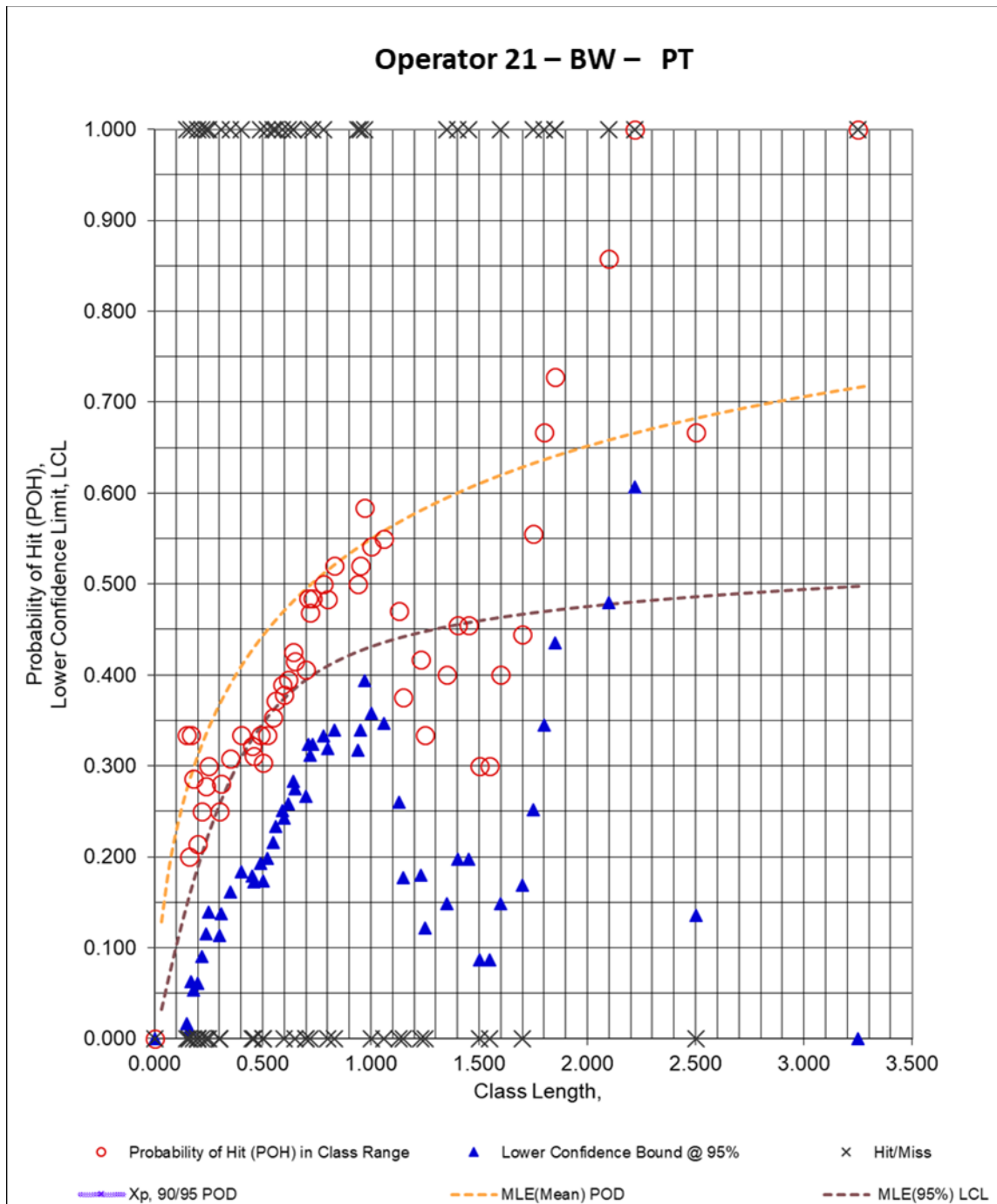


Figure 312. DOEPOD – BW – PT – Operator 21

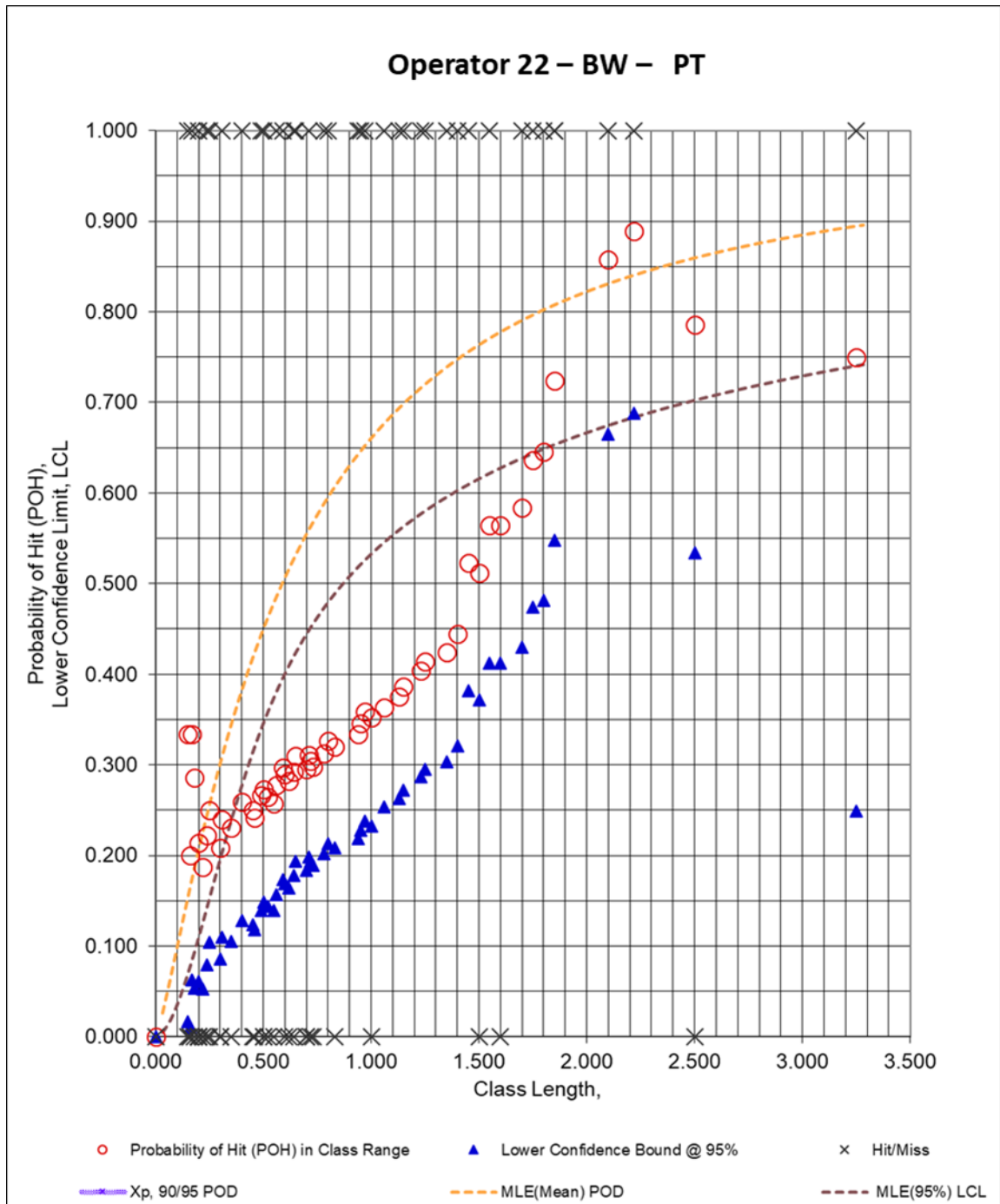


Figure 313. DOEPOD – BW – PT – Operator 22

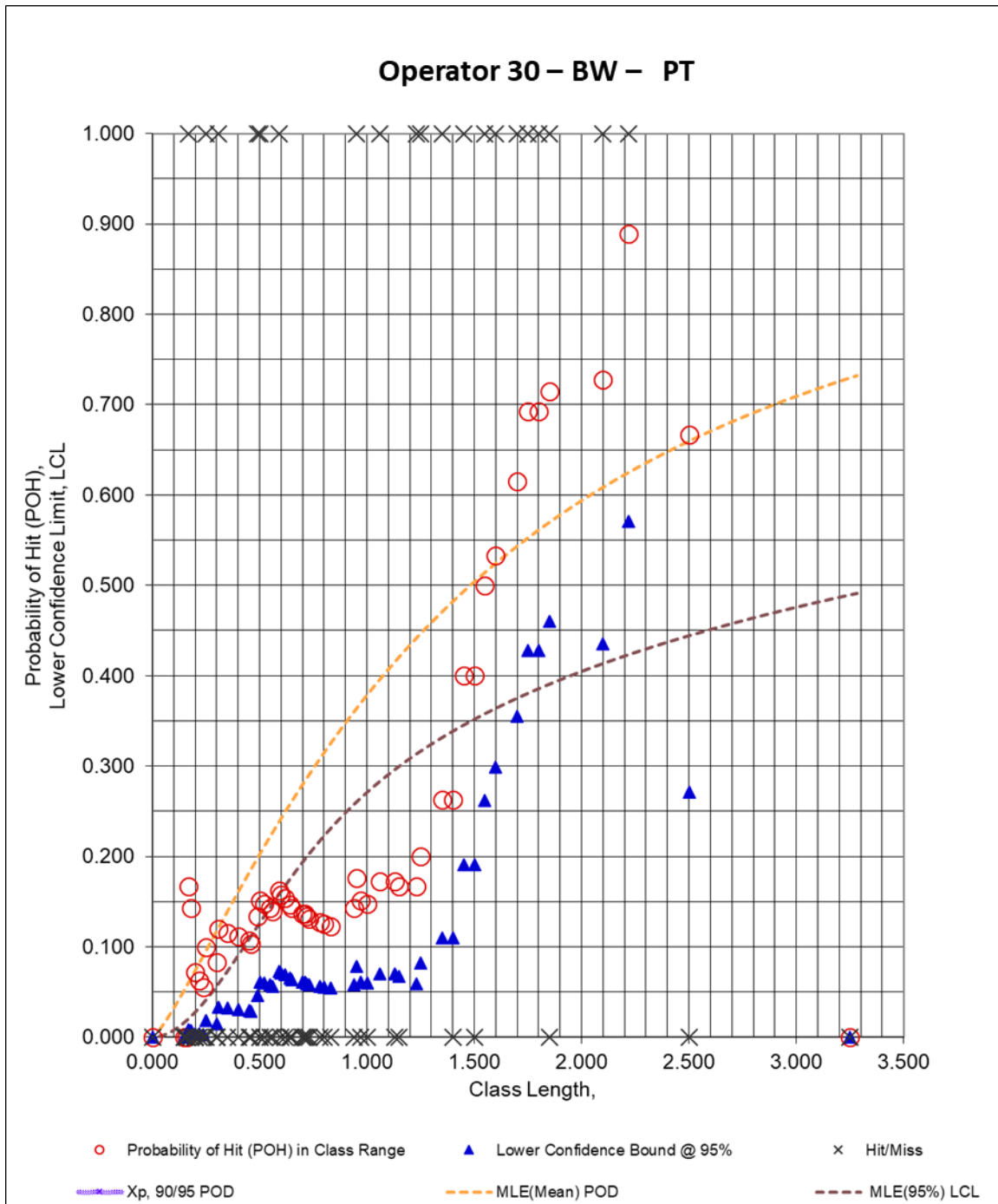


Figure 314. DOEPOD – BW – PT – Operator 30

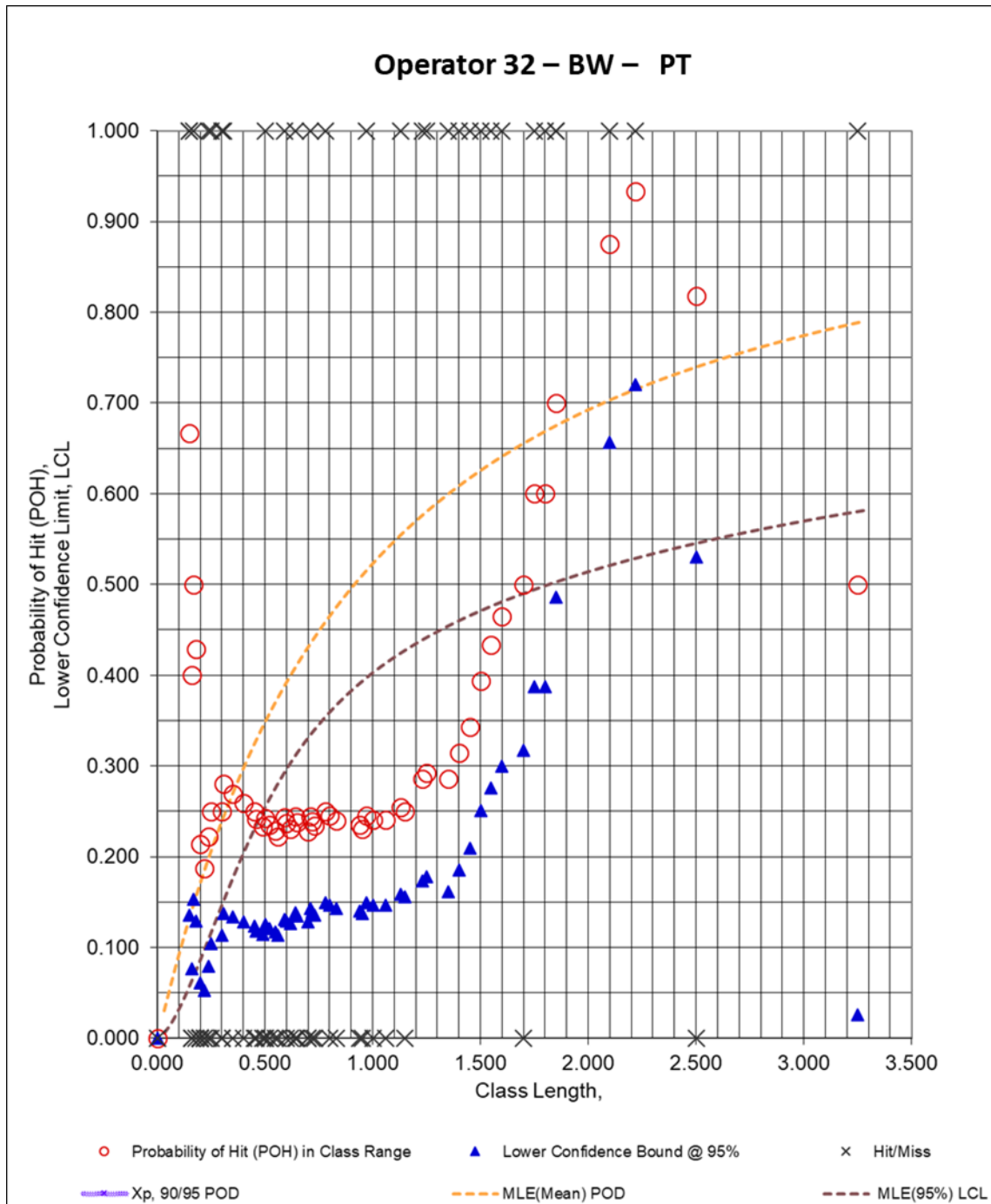


Figure 315. DOEPOD – BW – PT – Operator 32

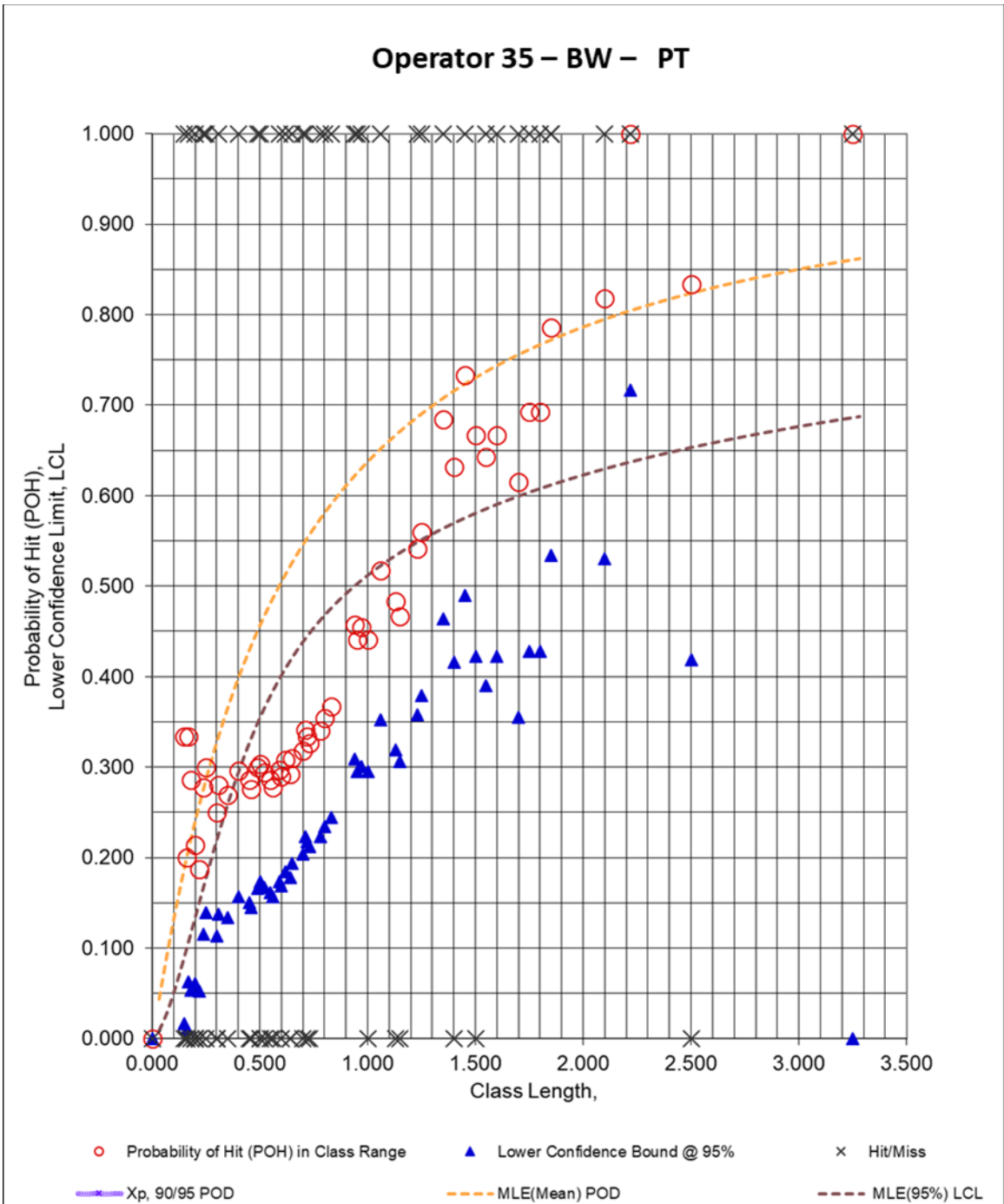


Figure 316. DOEPOD – BW – PT – Operator 35

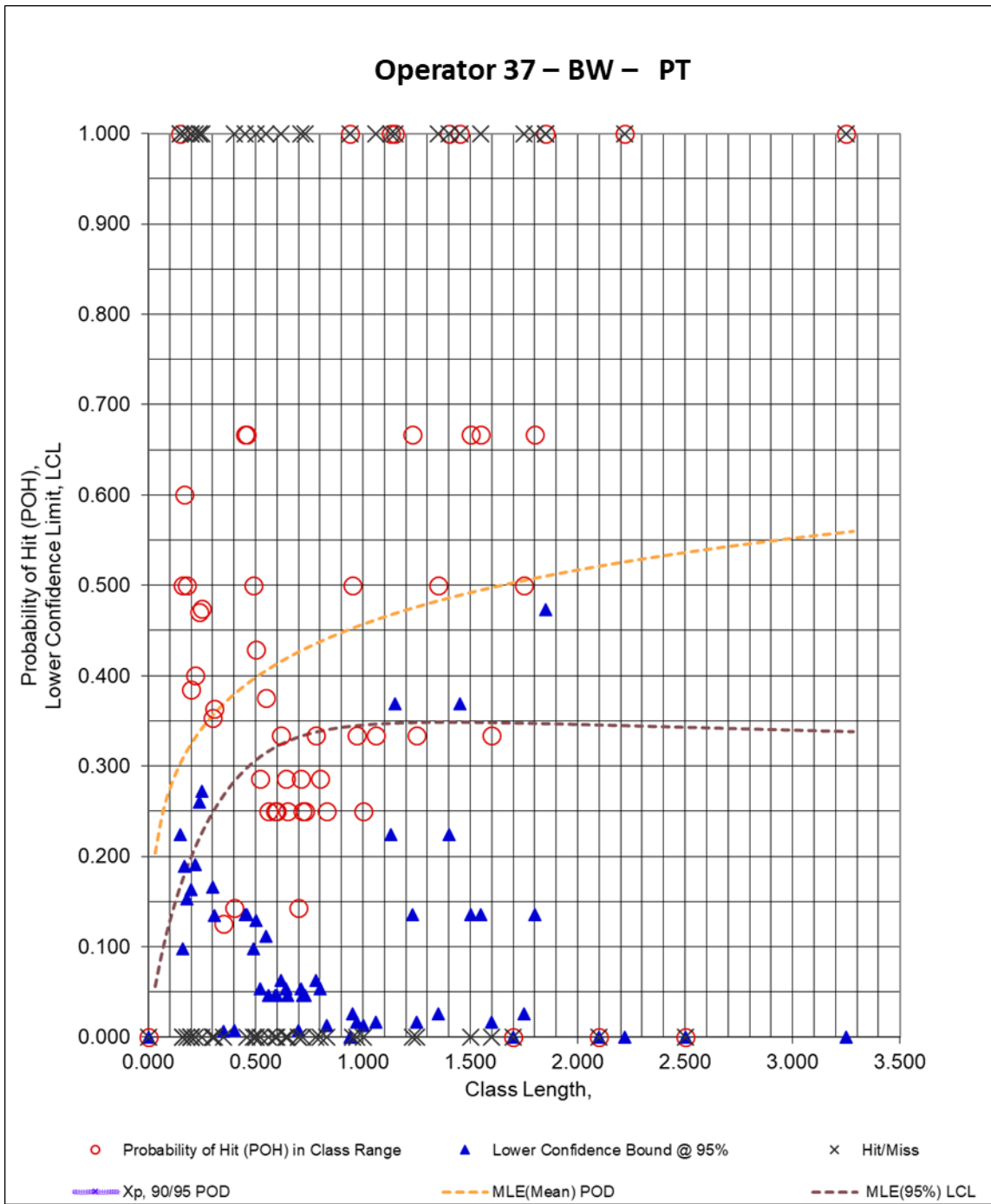


Figure 317. DOEPOD – BW – PT – Operator 37

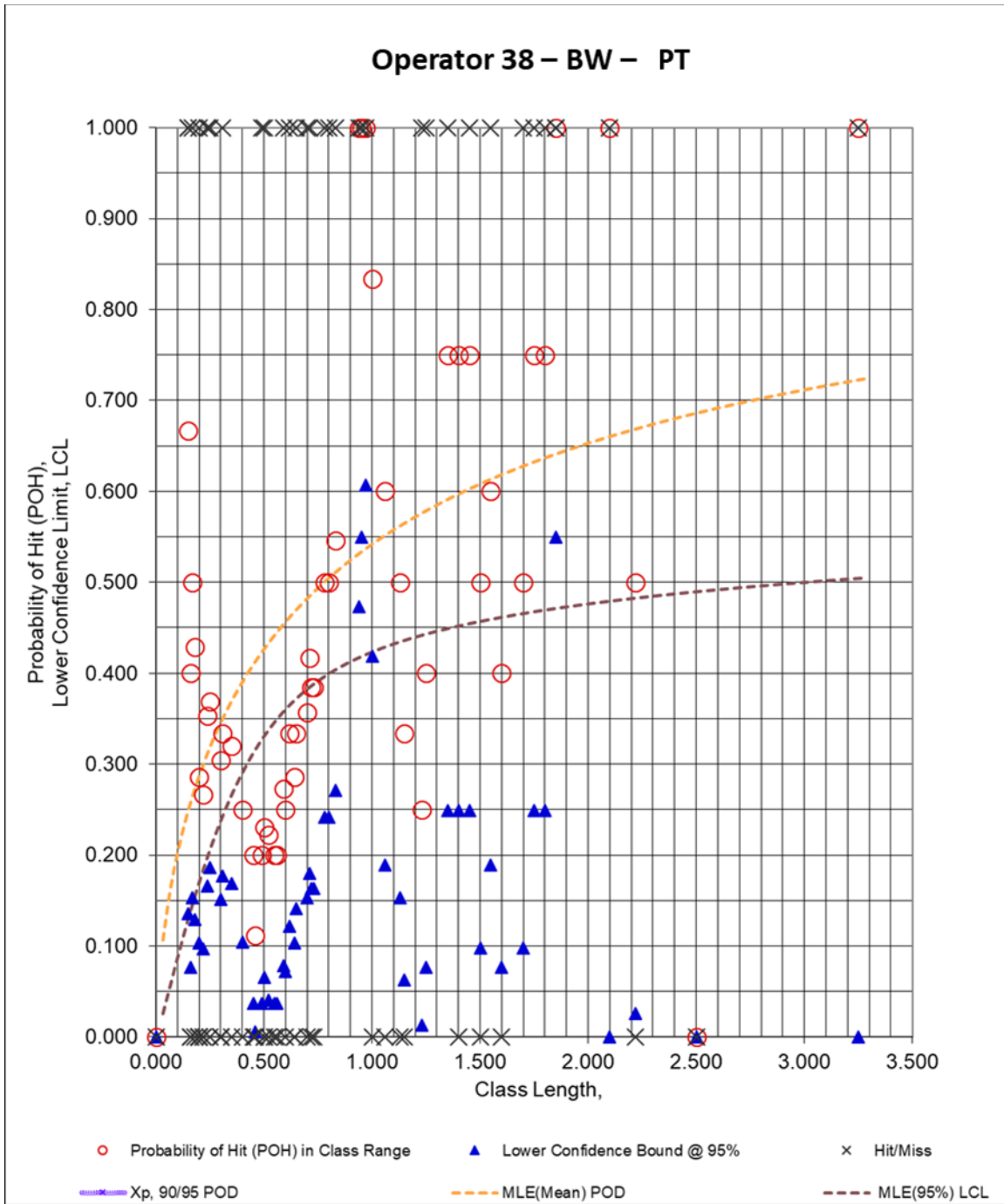


Figure 318. DOEPOD – BW – PT – Operator 38

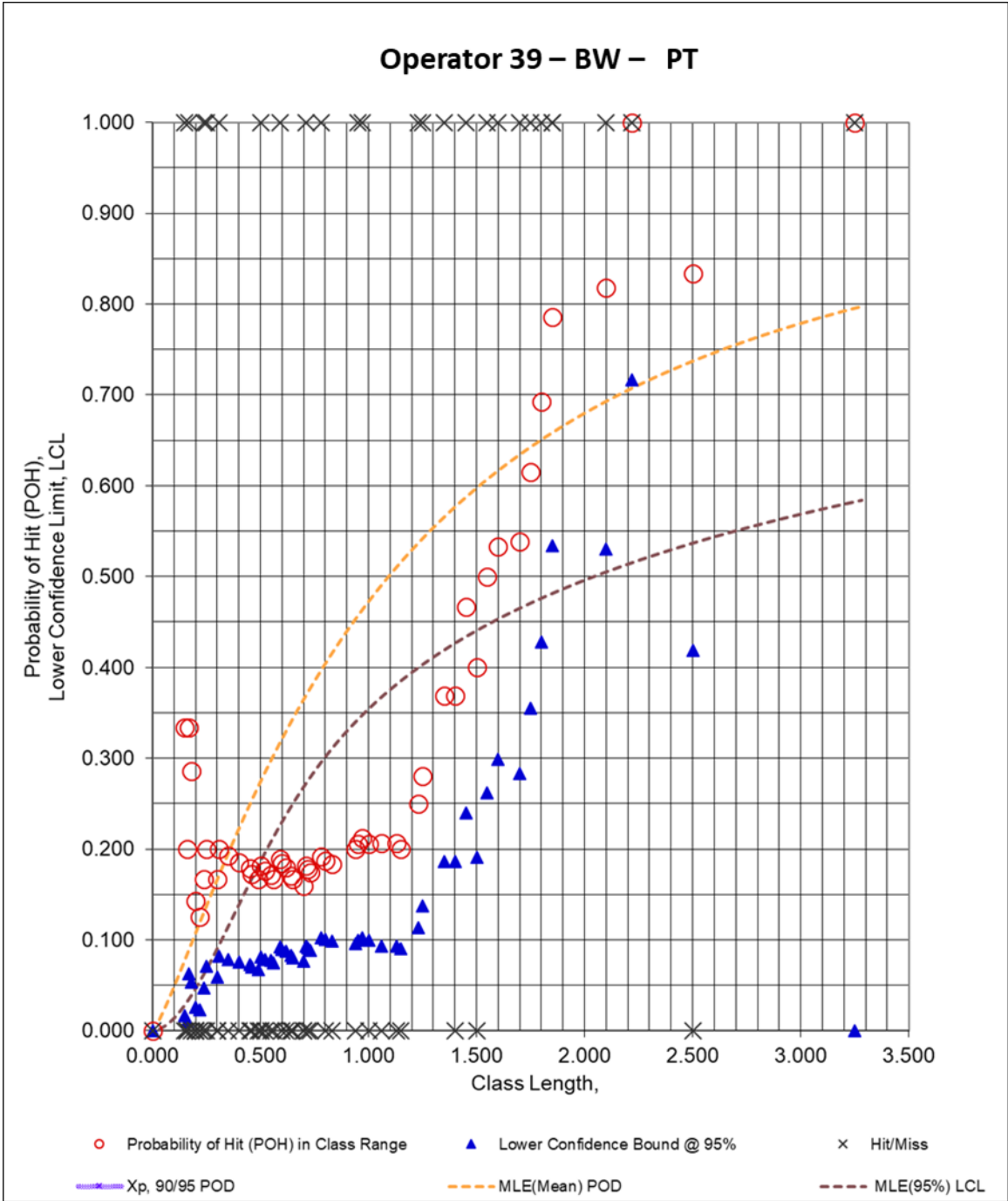


Figure 319. DOEPOD – BW – PT – Operator 39

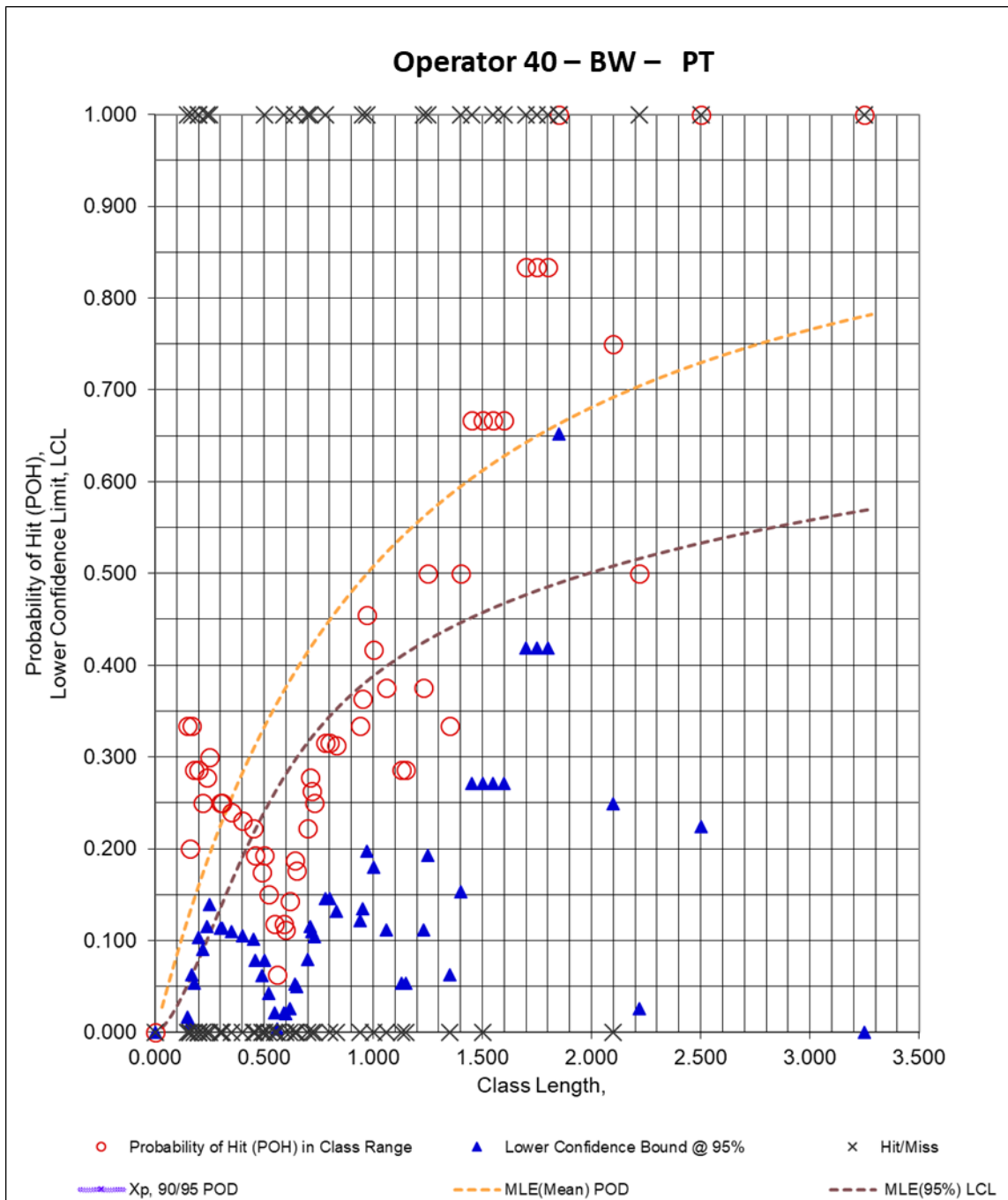


Figure 320. DOEPOD – BW – PT – Operator 40

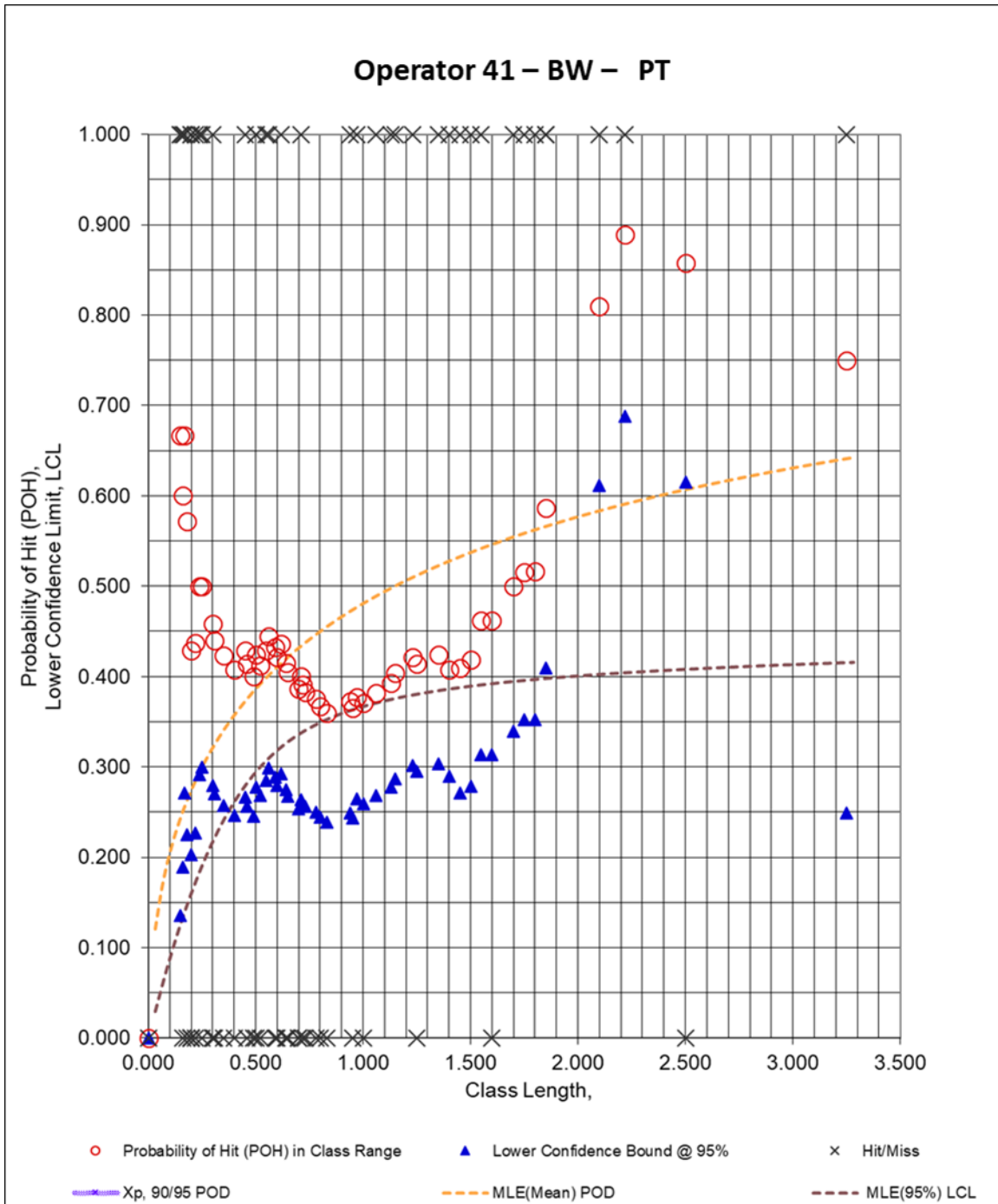


Figure 321. DOEPOD – BW – PT – Operator 41

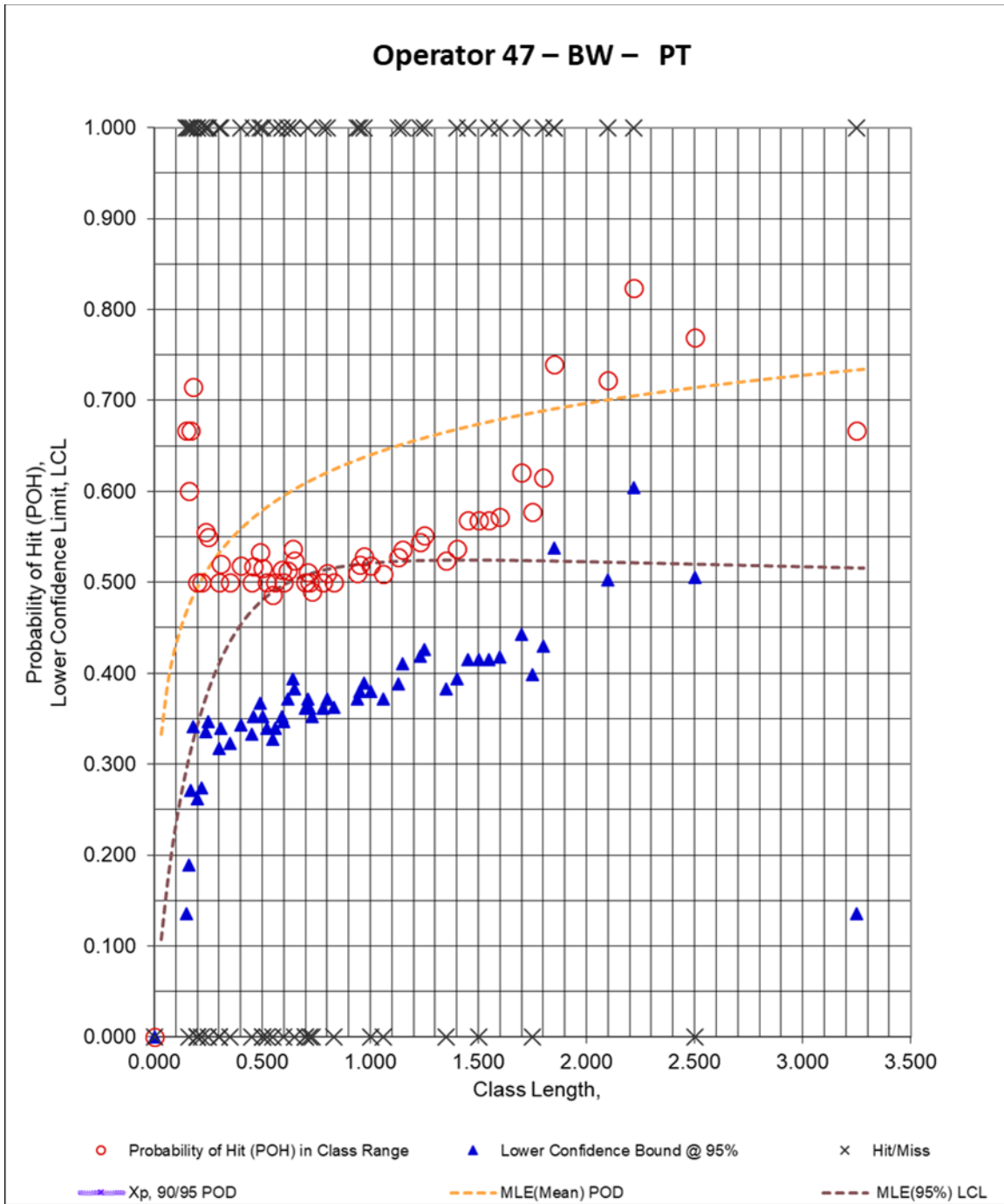


Figure 322. DOEPOD – BW – PT – Operator 47

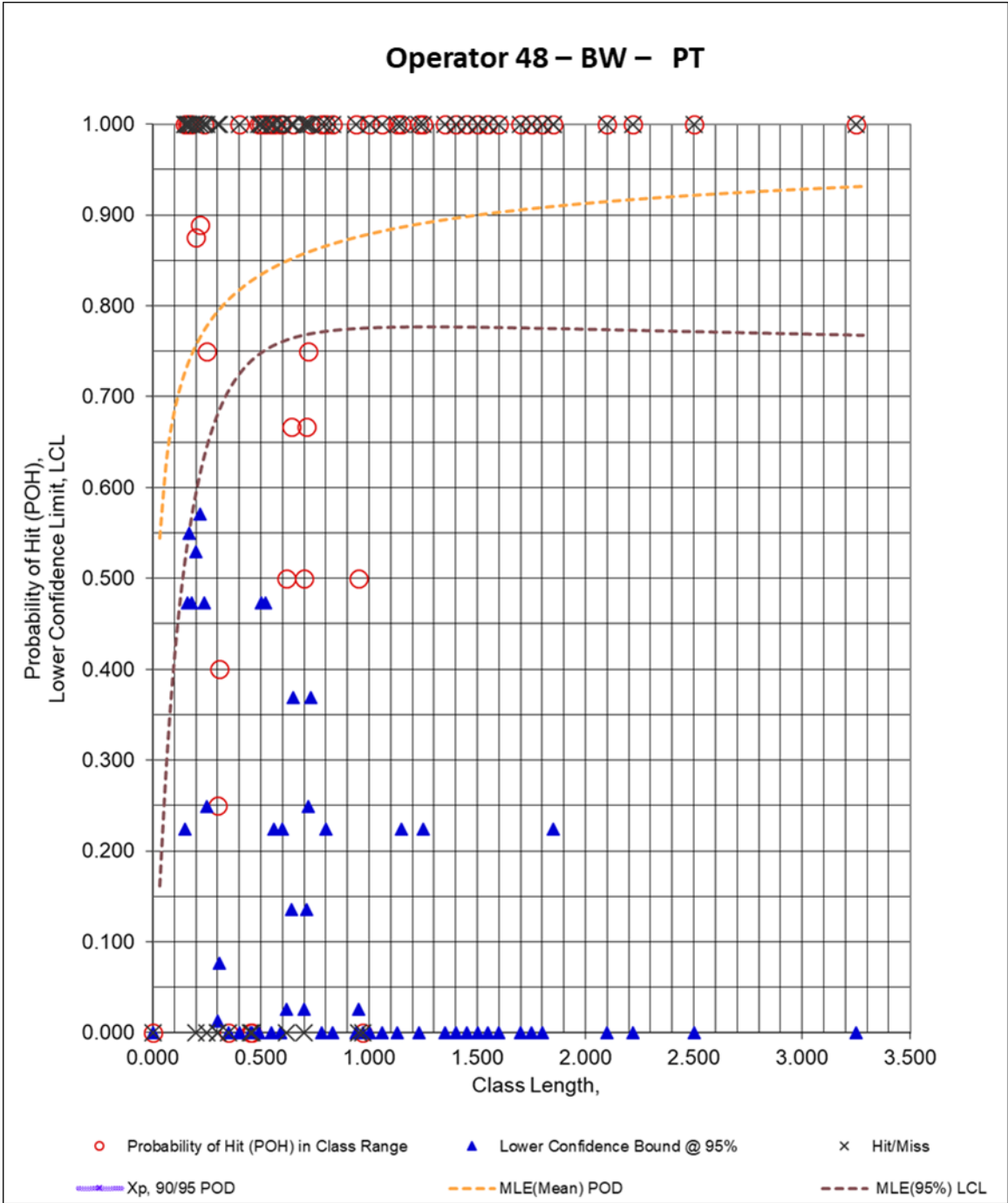


Figure 323. DOEPOD – BW – PT – Operator 48

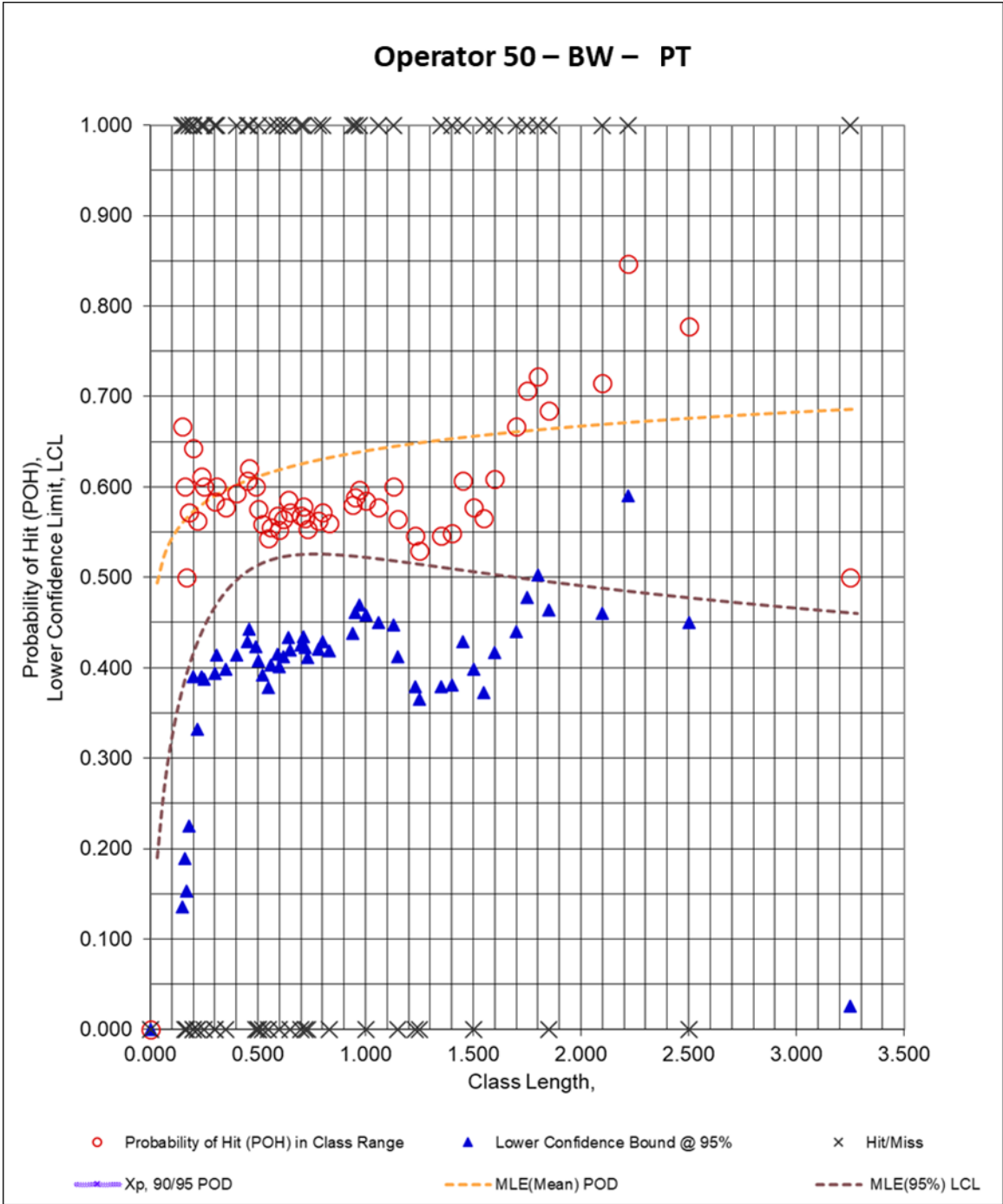


Figure 324. DOEPOD – BW – PT – Operator 50

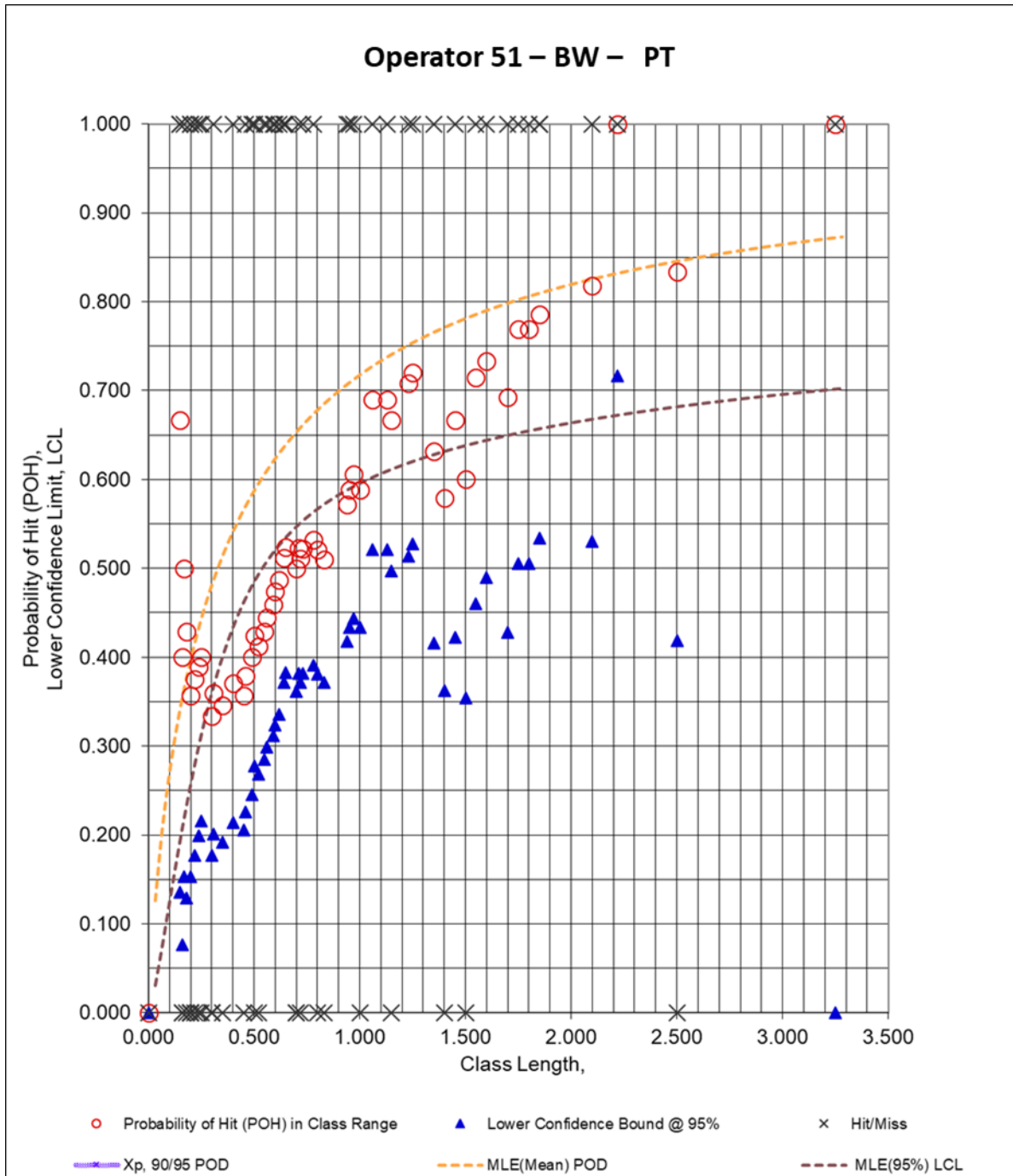


Figure 325. DOEPOD – BW – PT – Operator 51

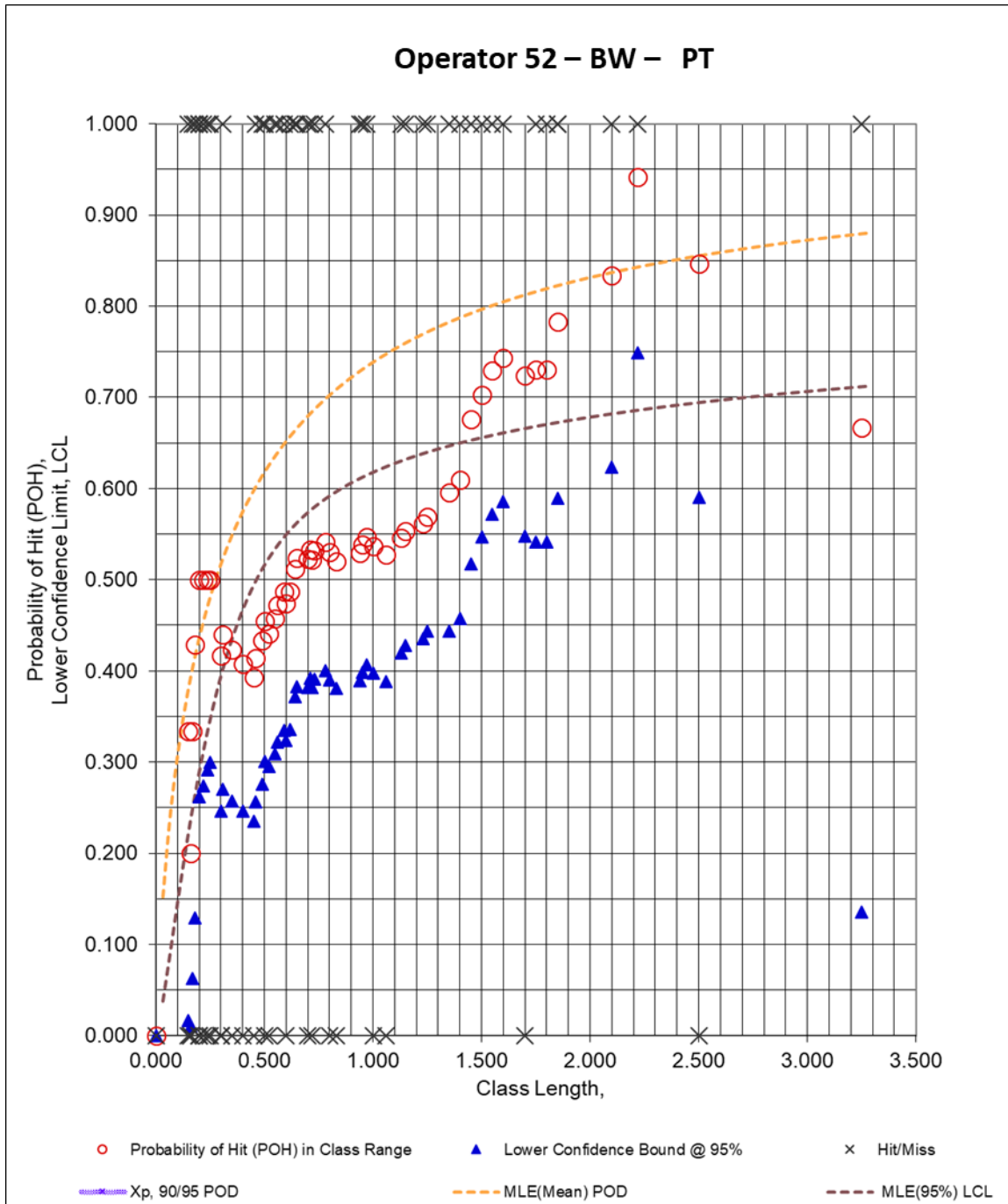


Figure 326. DOEPOD – BW – PT – Operator 52

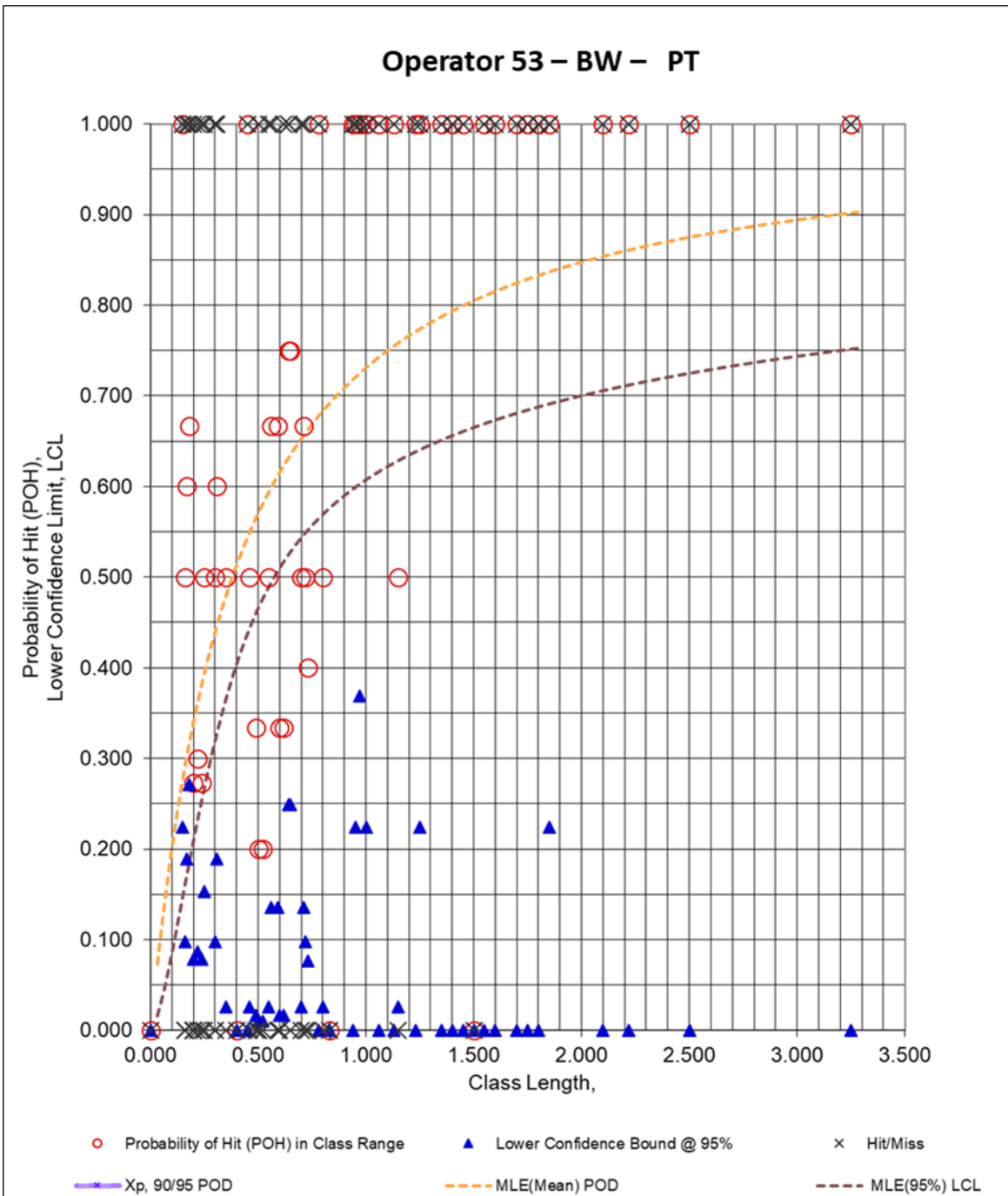


Figure 327. DOEPOD – BW – PT – Operator 53

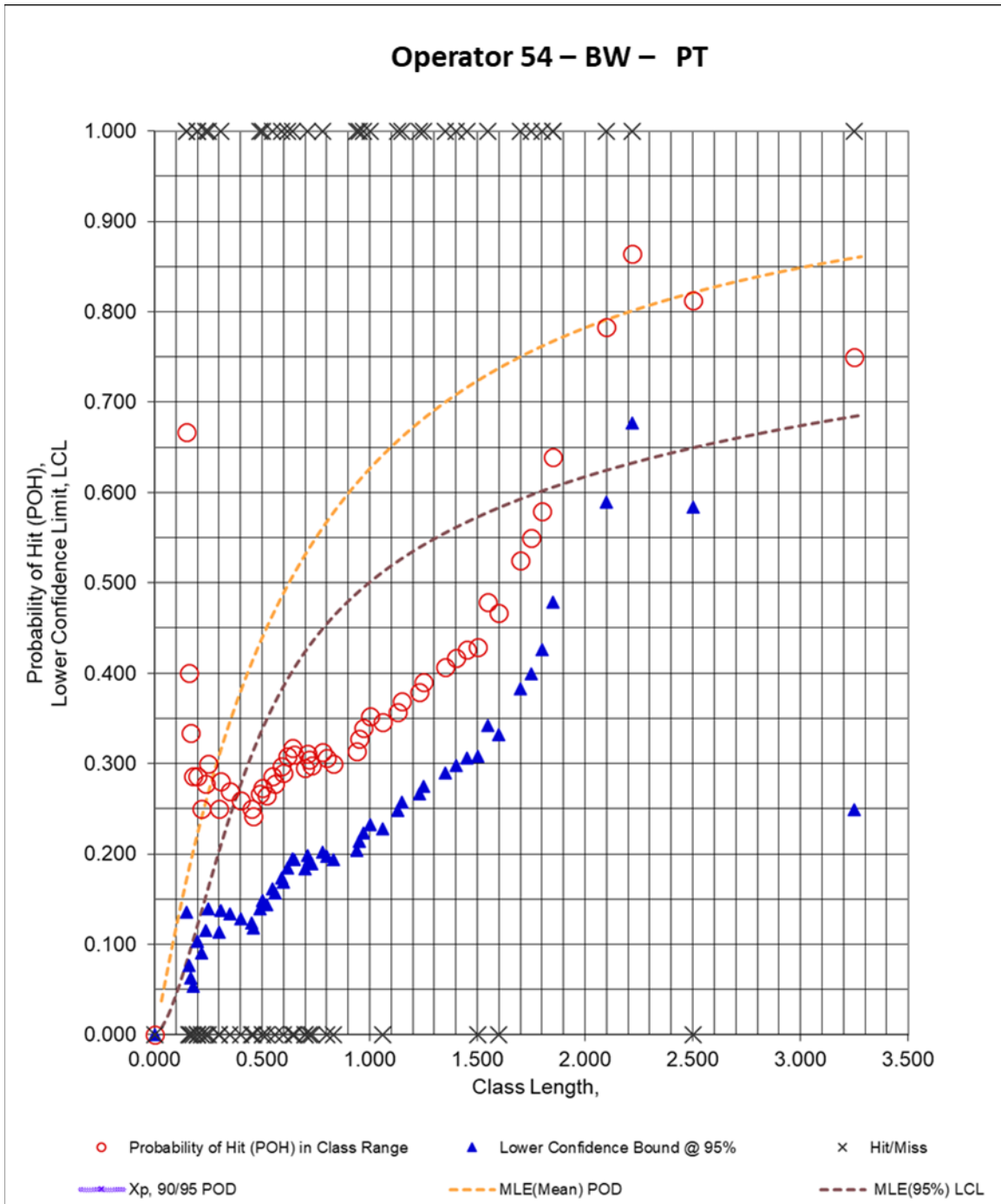


Figure 328. DOEPOD – BW – PT – Operator 54

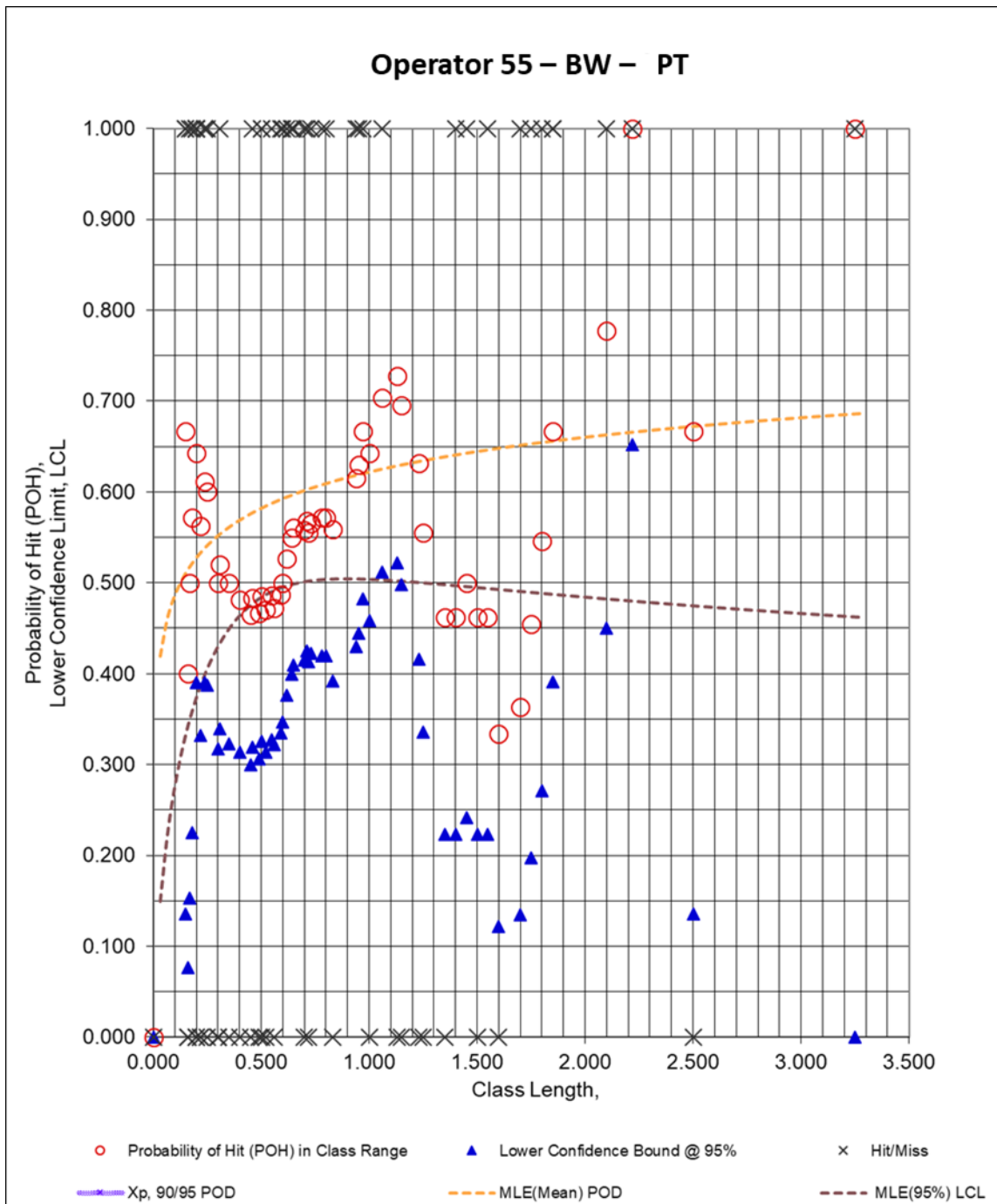


Figure 329. DOEPOD – BW – PT – Operator 55

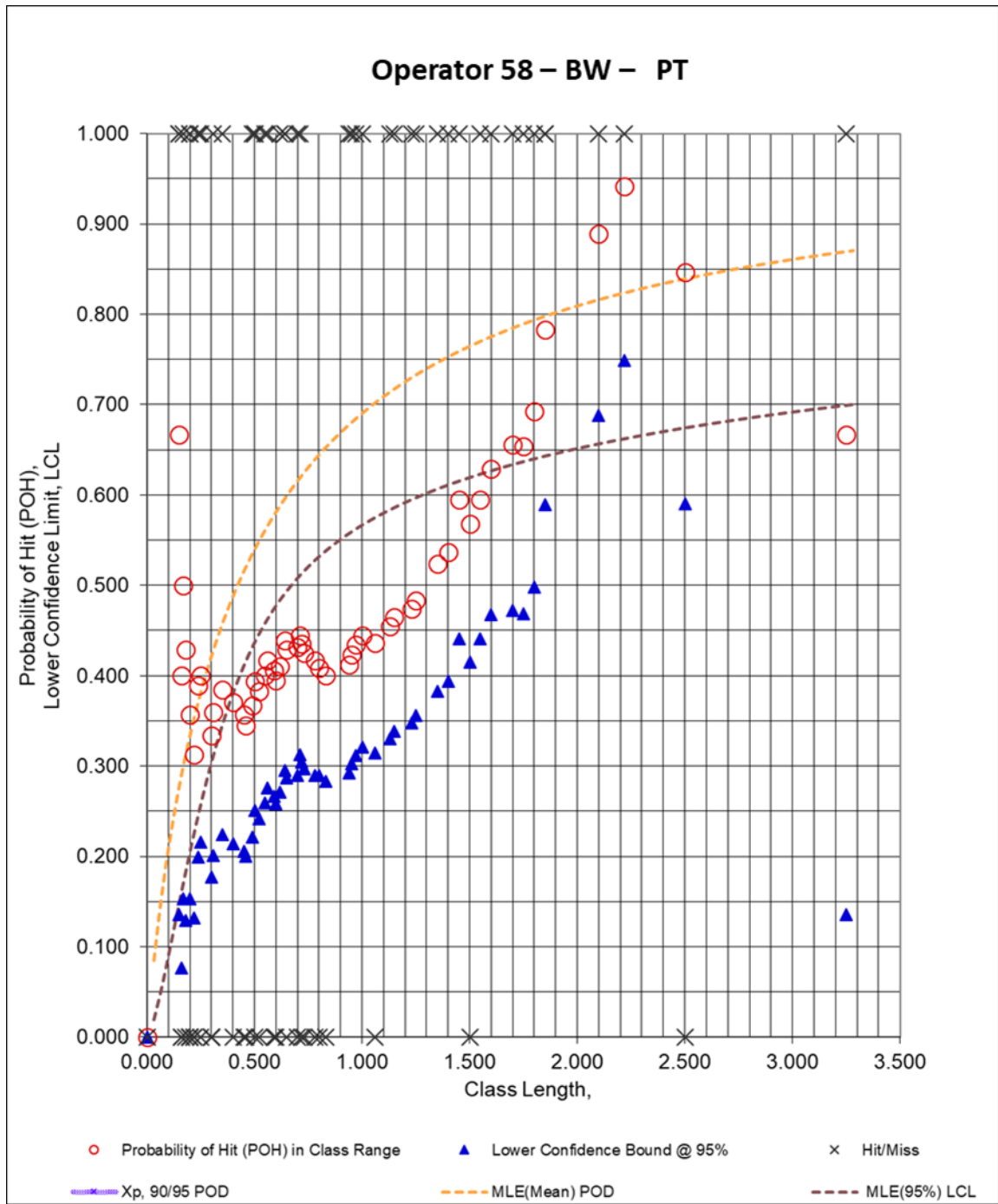


Figure 330. DOEPOD – BW – PT – Operator 58

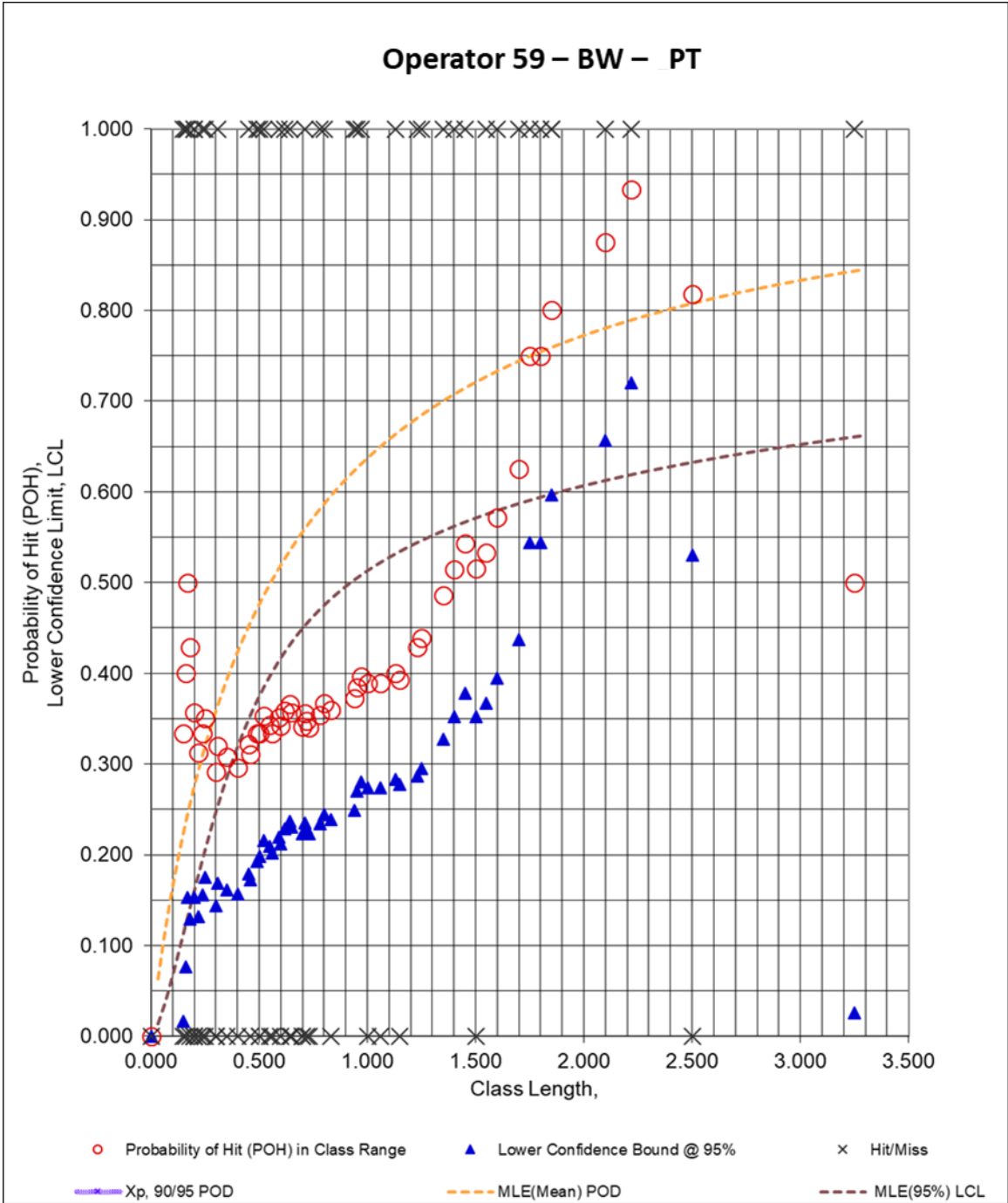


Figure 331. DOEPOD – BW – PT – Operator 59

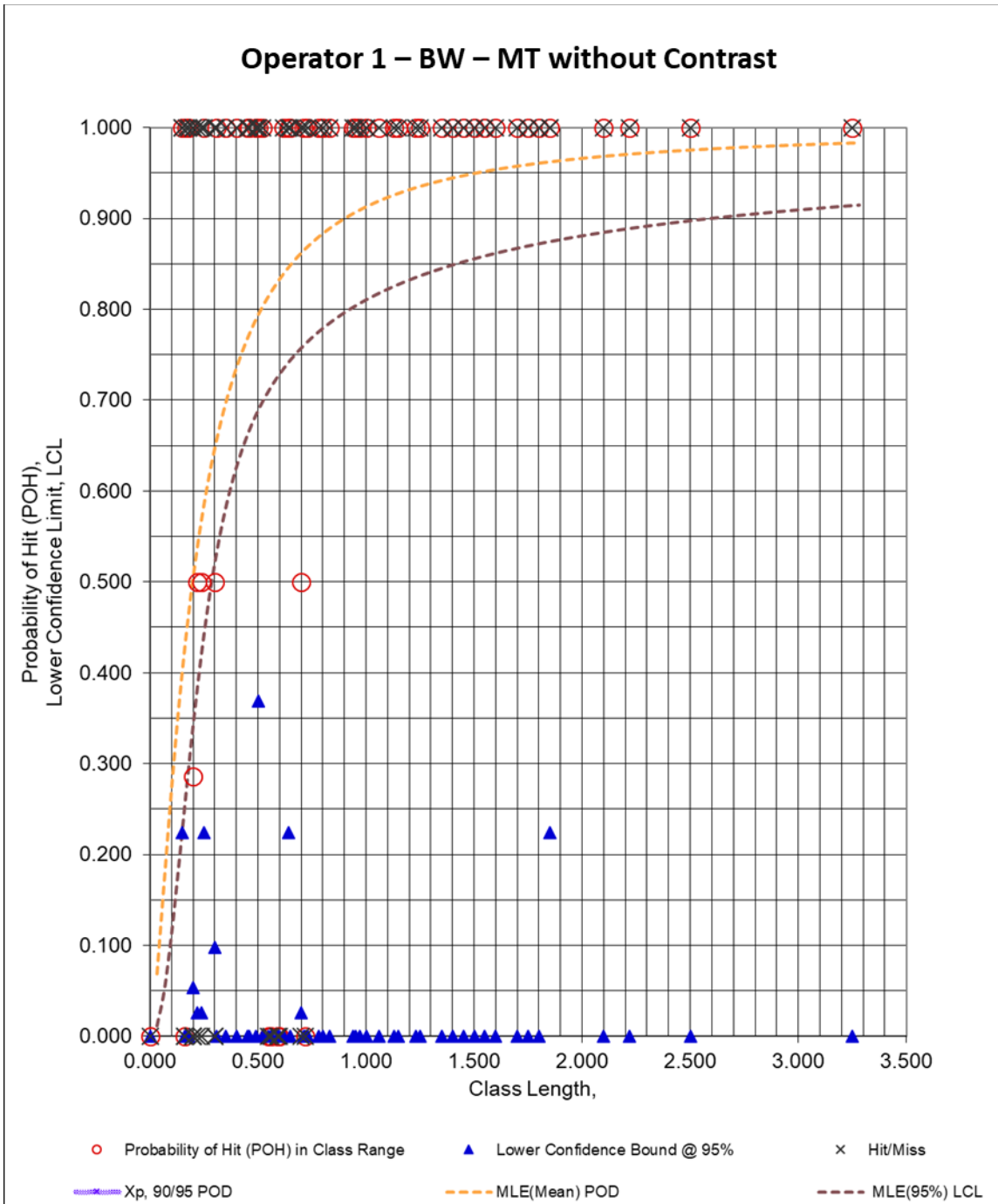


Figure 332. DOEPOD – BW – MT without Contrast – Operator 1

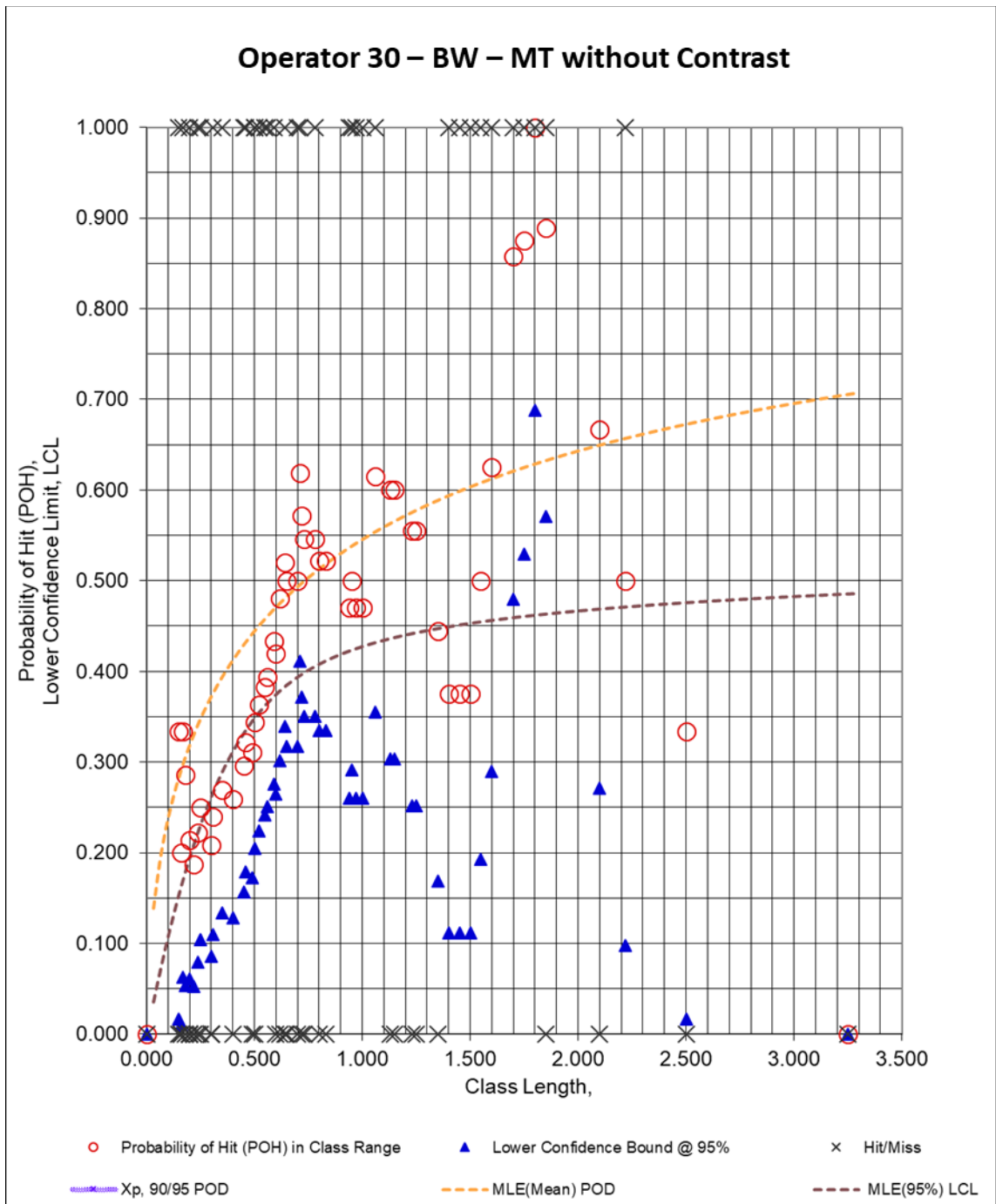


Figure 333. DOEPOD – BW – MT without Contrast – Operator 30

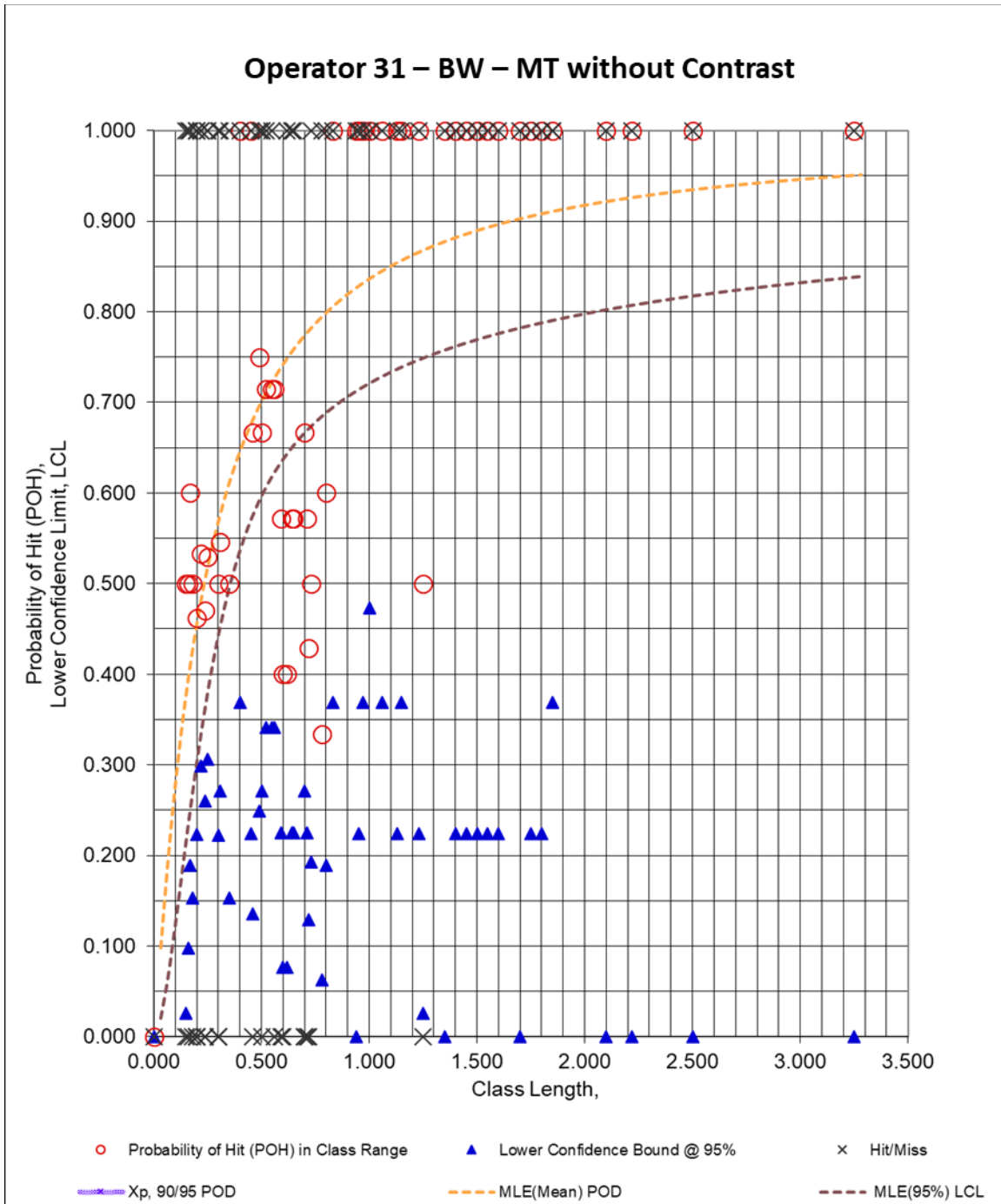


Figure 334. DOEPOD – BW – MT without Contrast – Operator 31

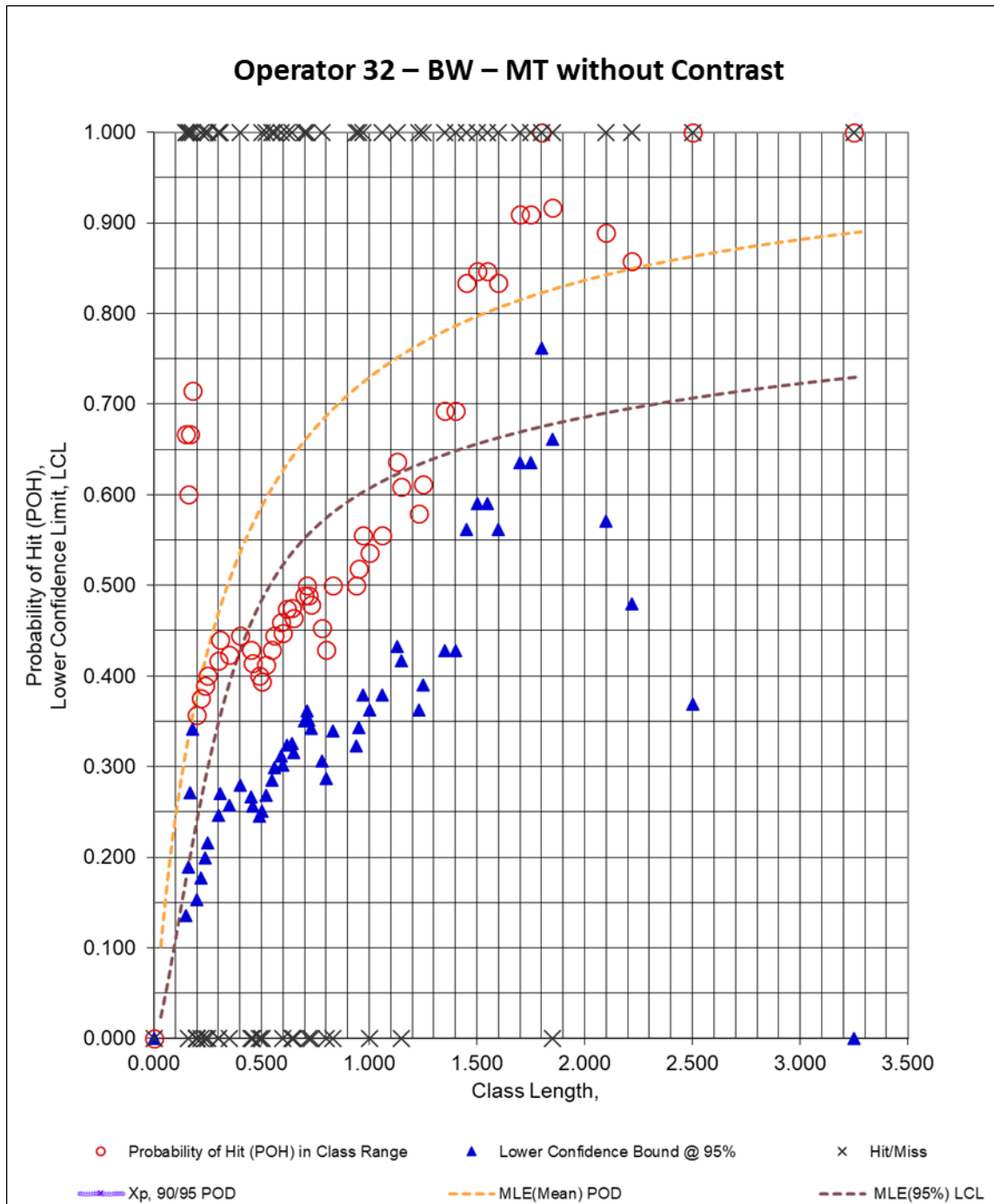


Figure 335. DOEPOD – BW – MT without Contrast – Operator 32

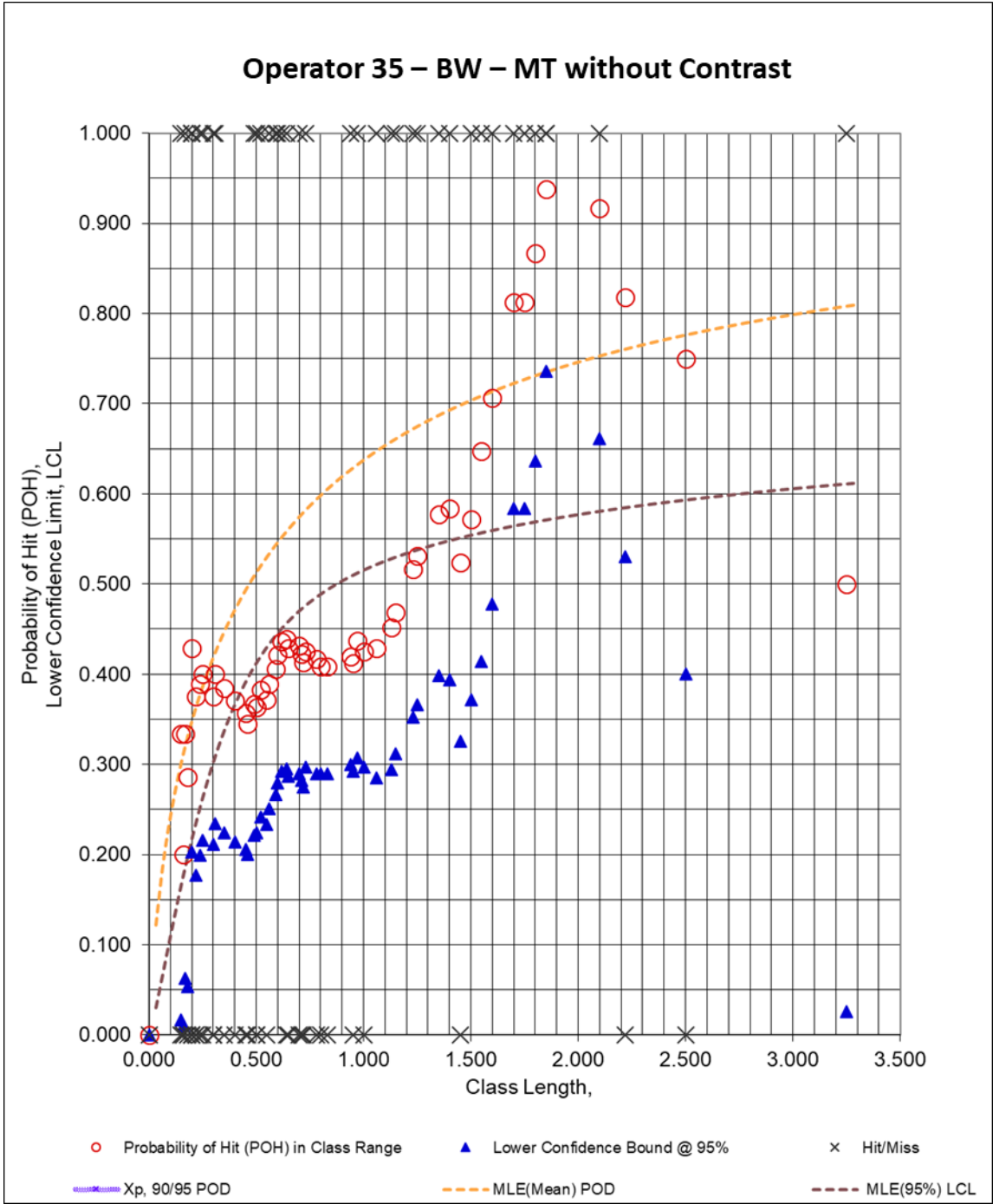


Figure 336. DOEPOD – BW – MT without Contrast – Operator 35

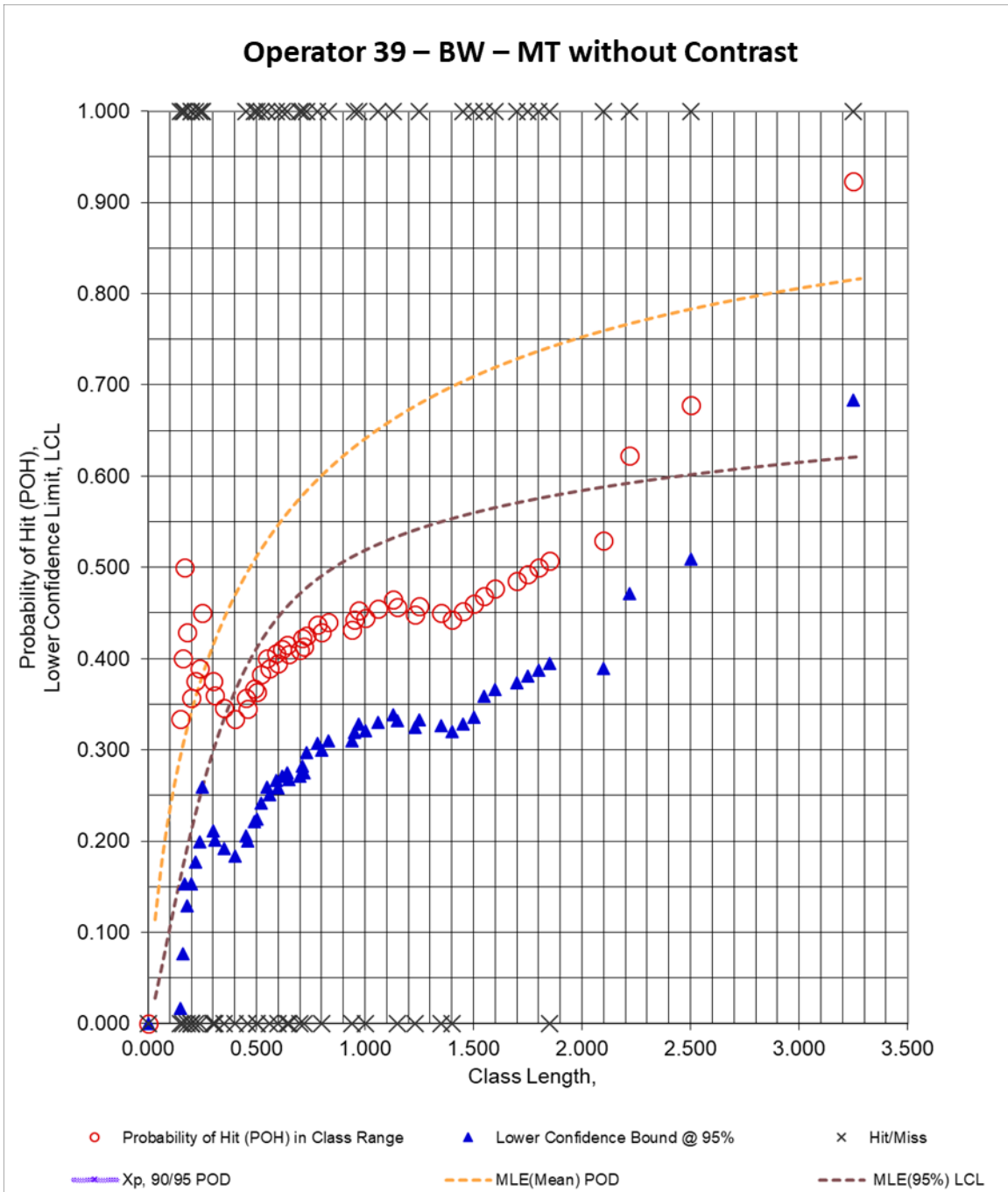


Figure 337. DOEPOD – BW – MT without Contrast – Operator 39

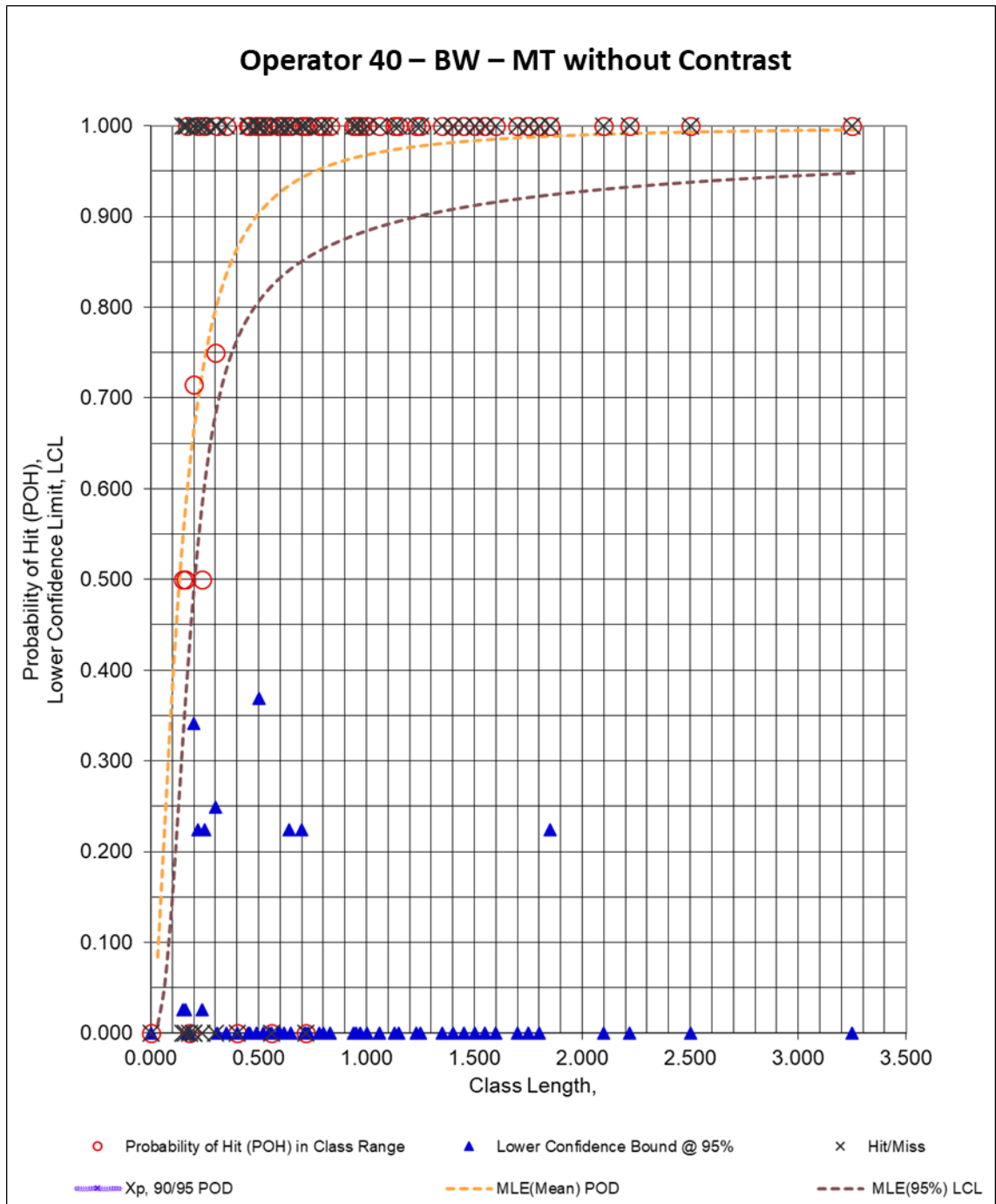


Figure 338. DOEPOD – BW – MT without Contrast – Operator 40

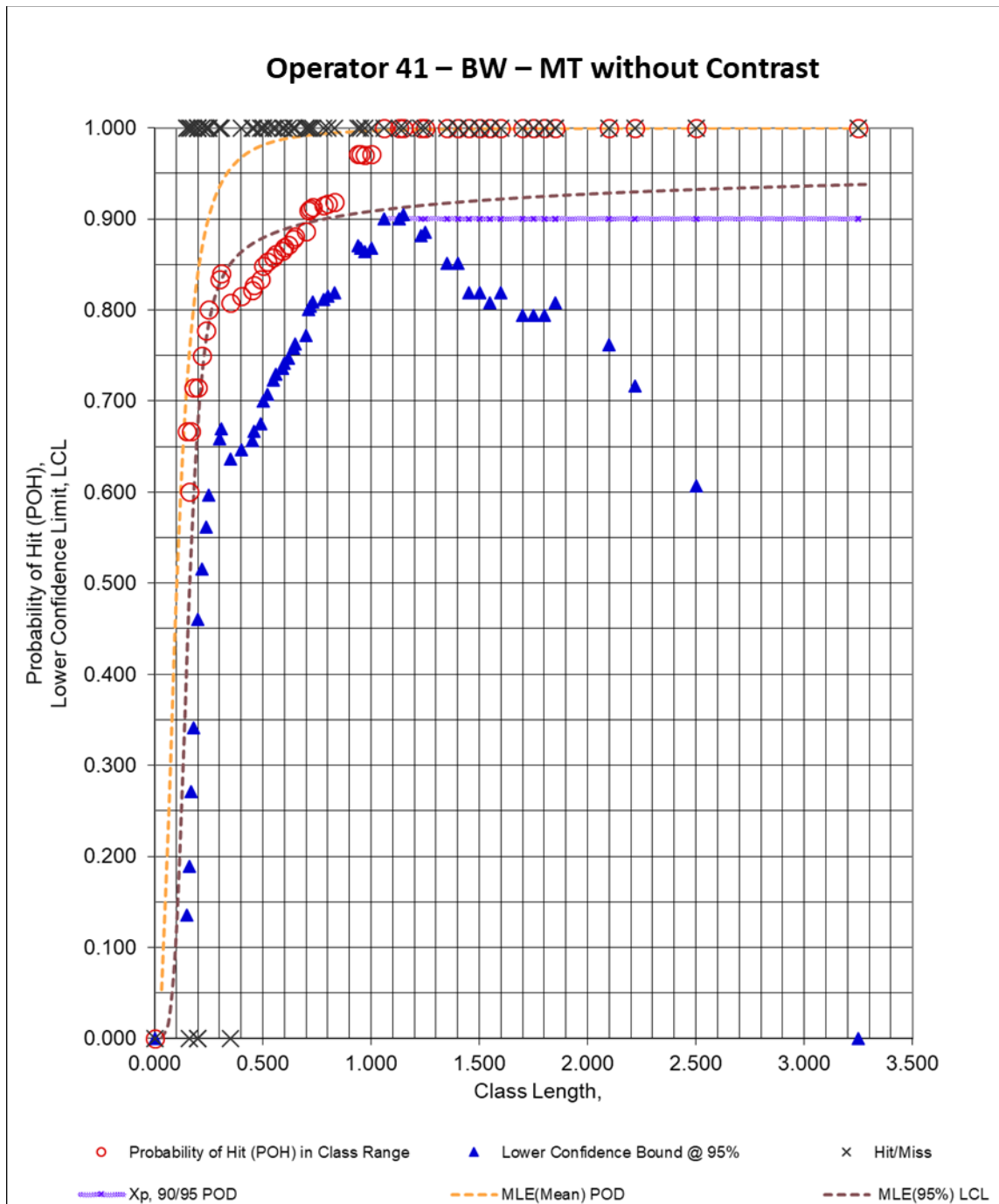


Figure 339. DOEPOD – BW – MT without Contrast – Operator 41

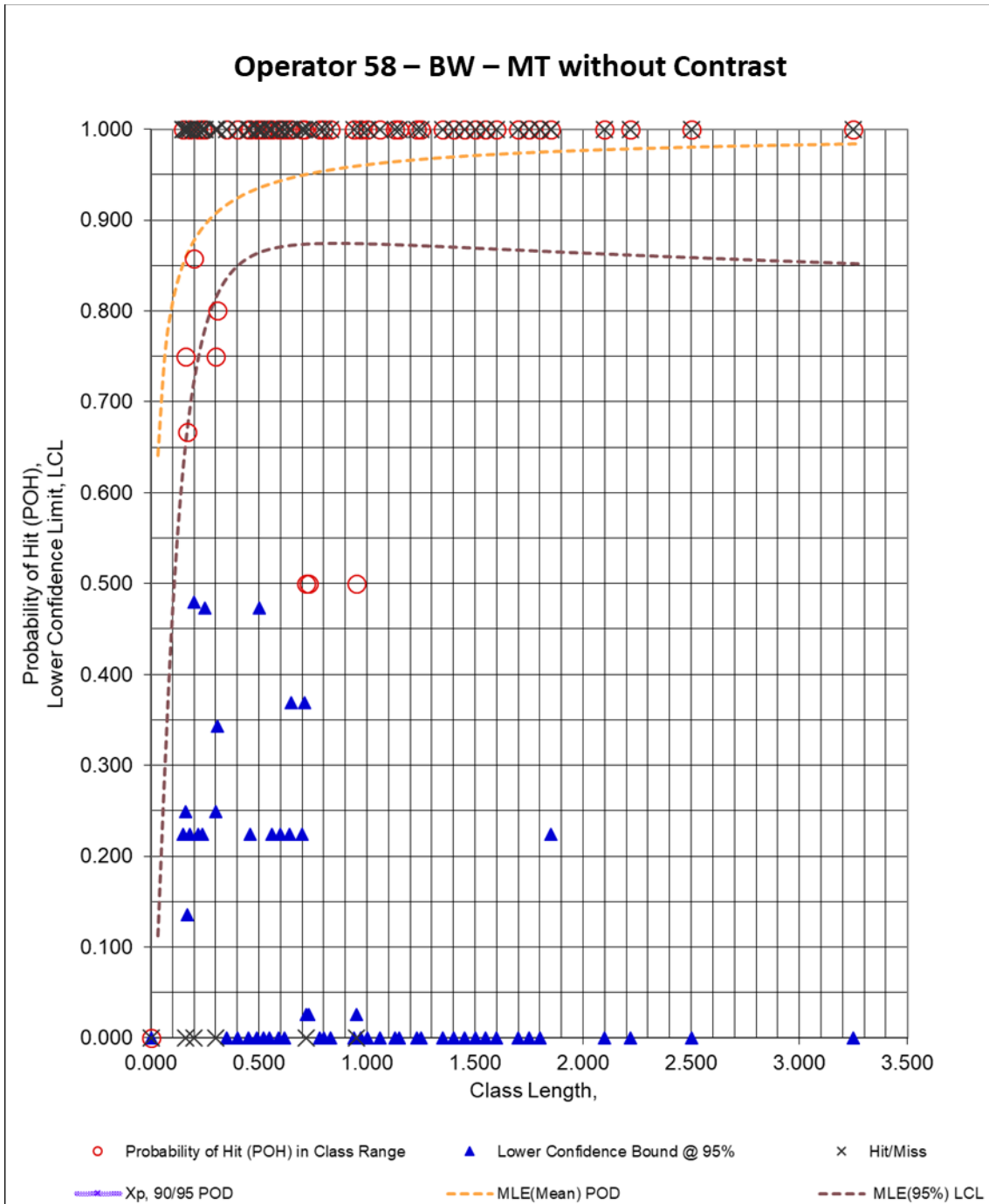


Figure 340. DOEPOD – BW – MT without Contrast – Operator 58

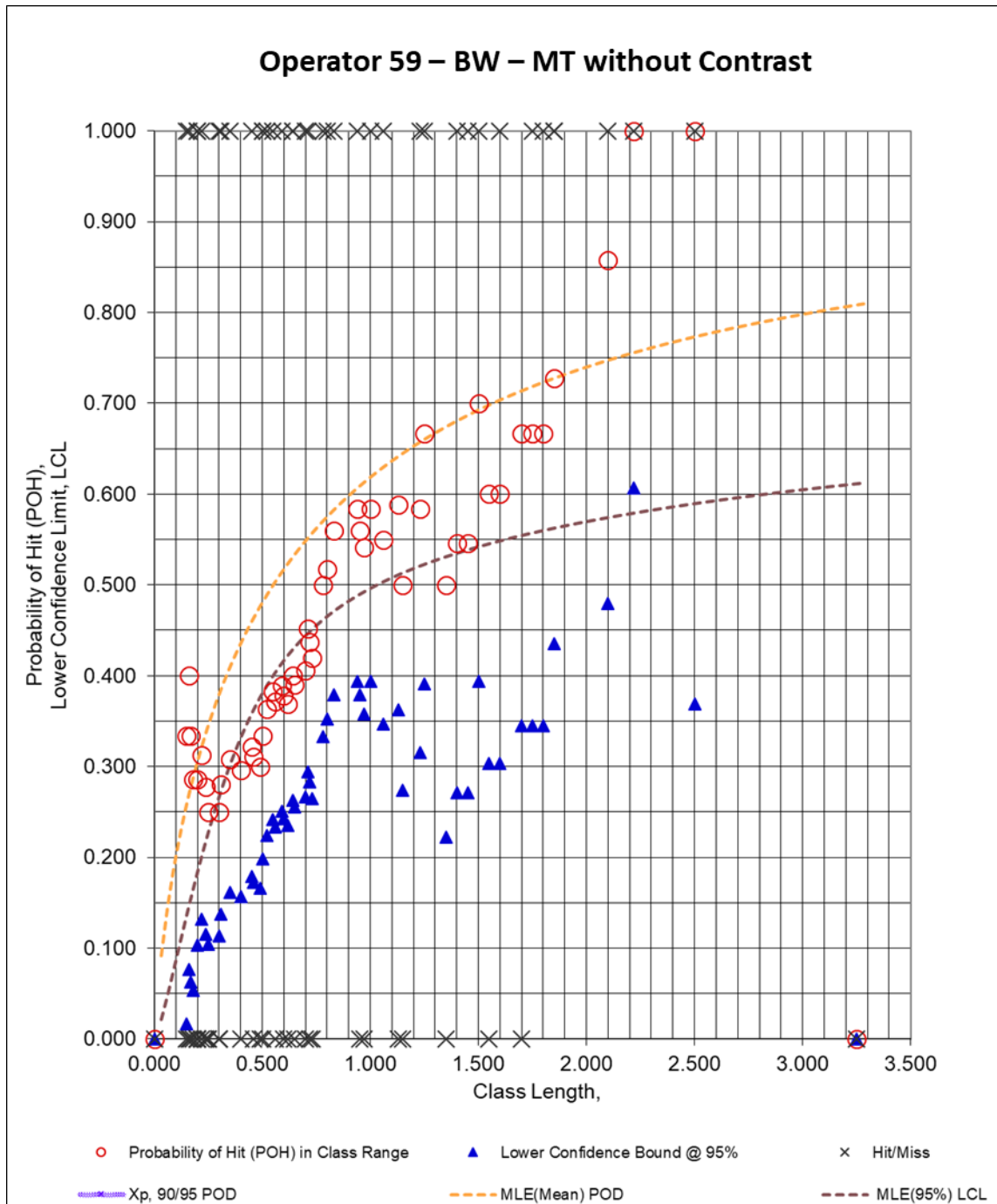


Figure 341. DOEPOD – BW – MT without Contrast – Operator 59

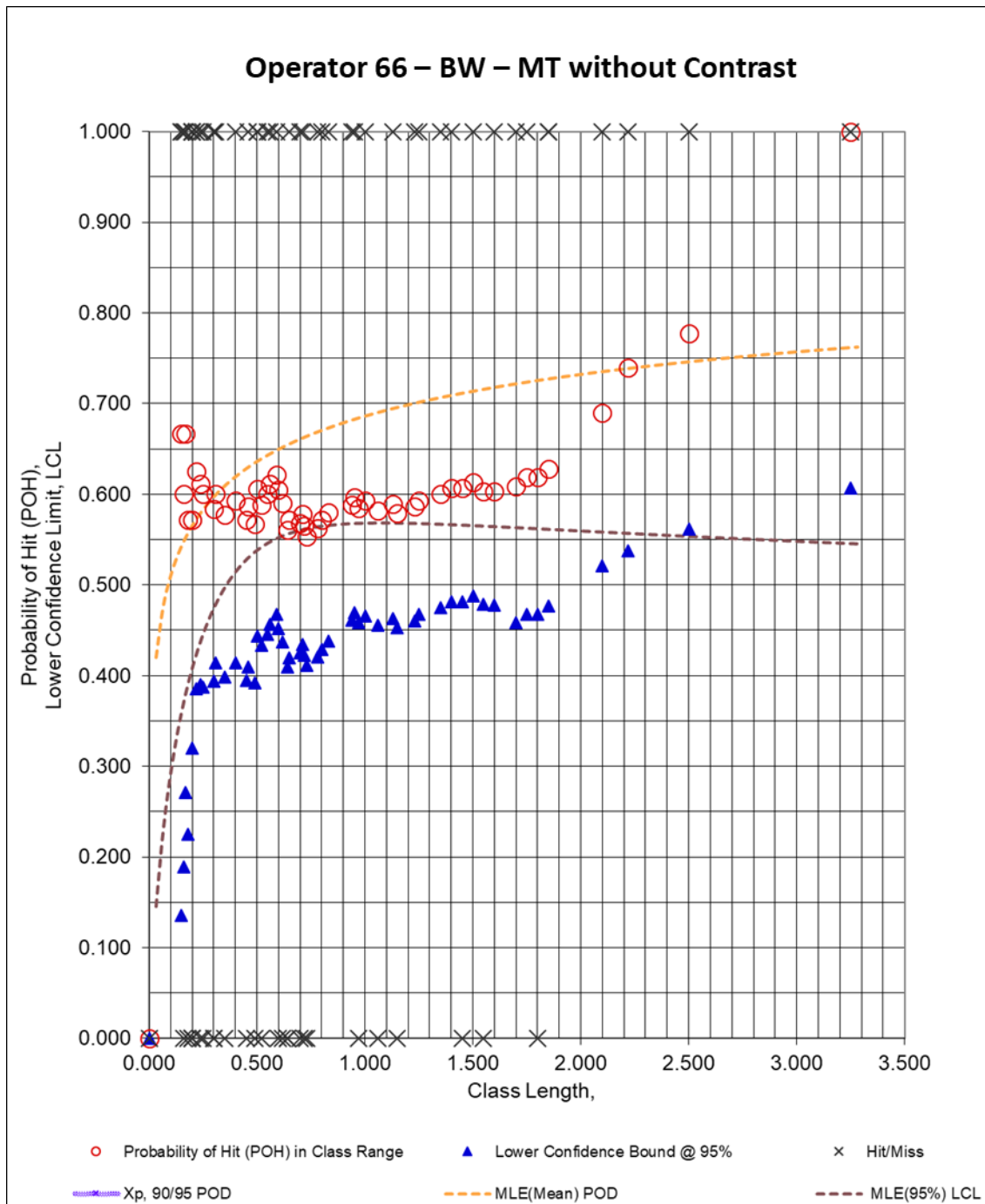


Figure 342. DOEPOD – BW – MT without Contrast – Operator 66

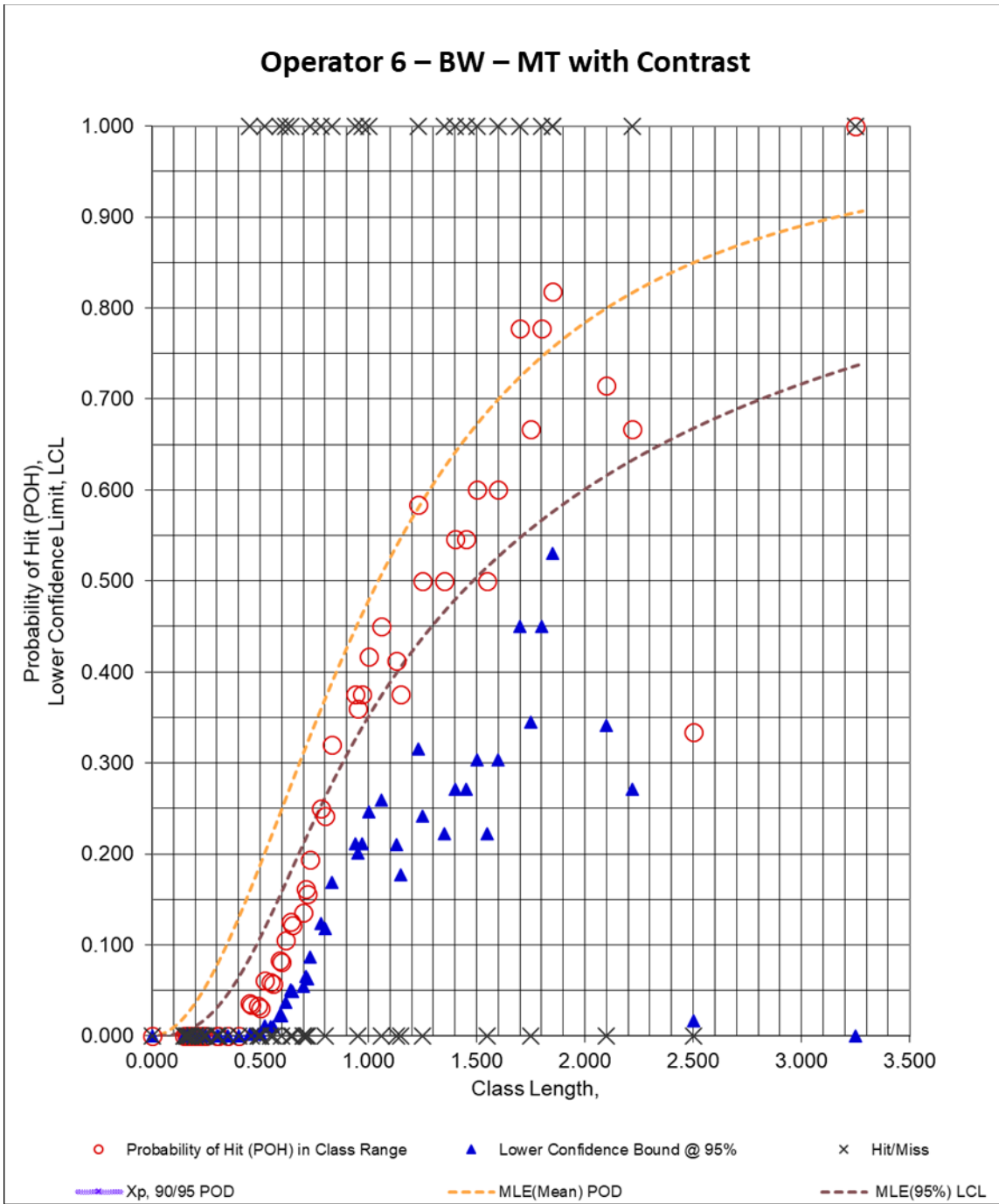


Figure 343. DOEPOD – BW – MT with Contrast – Operator 6

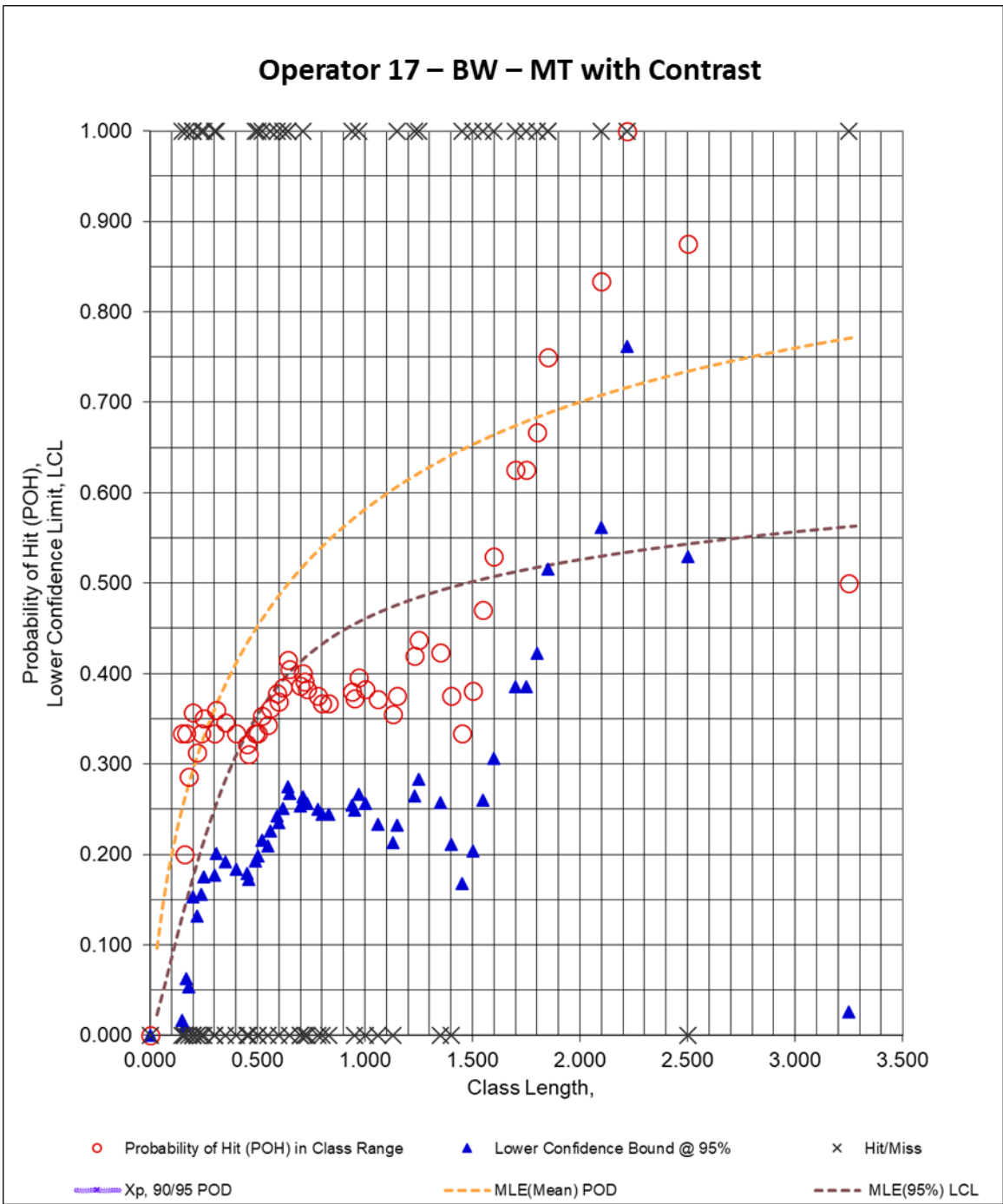


Figure 344. DOEPOD – BW – MT with Contrast – Operator 17

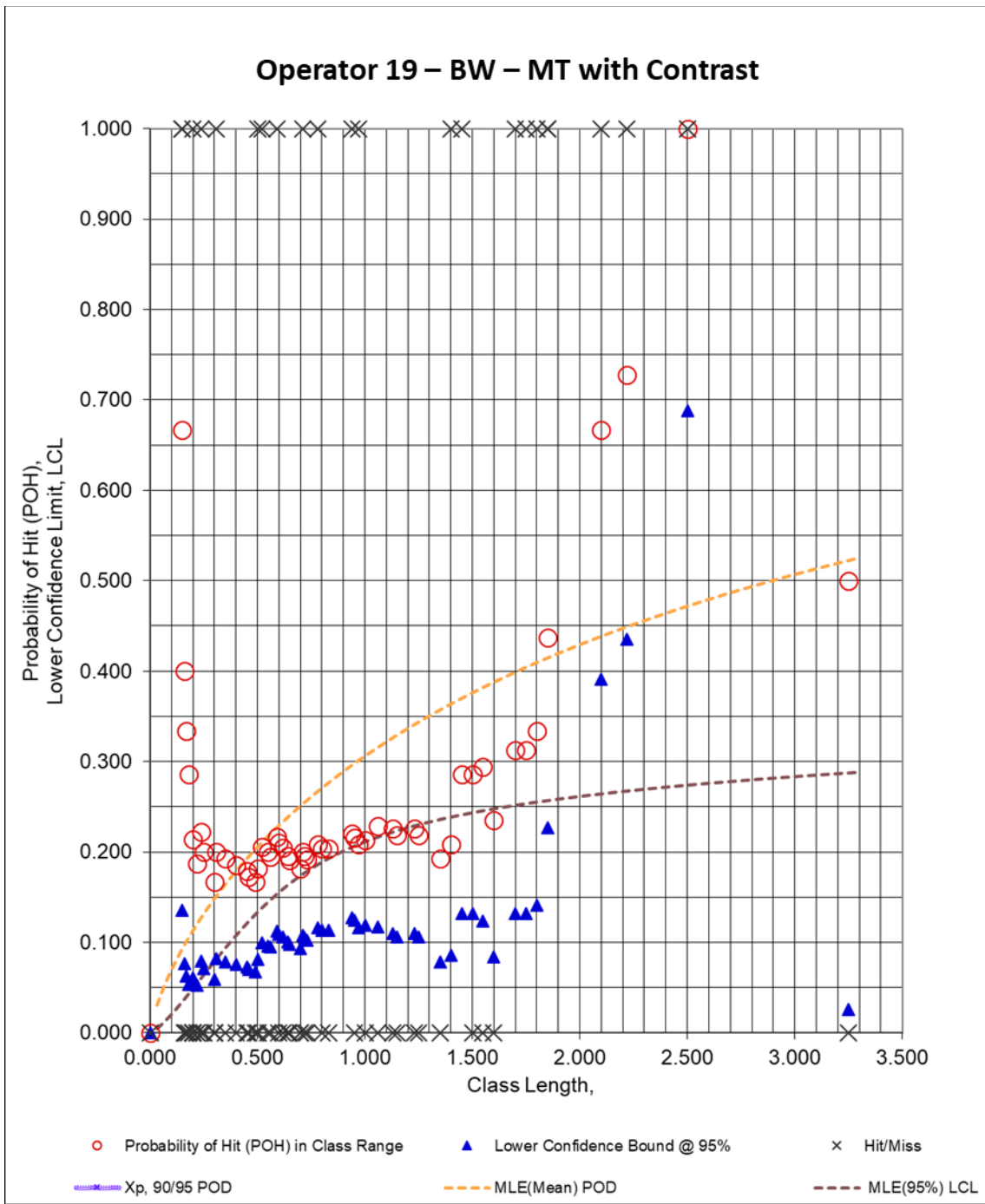


Figure 345. DOEPOD – BW – MT with Contrast – Operator 19

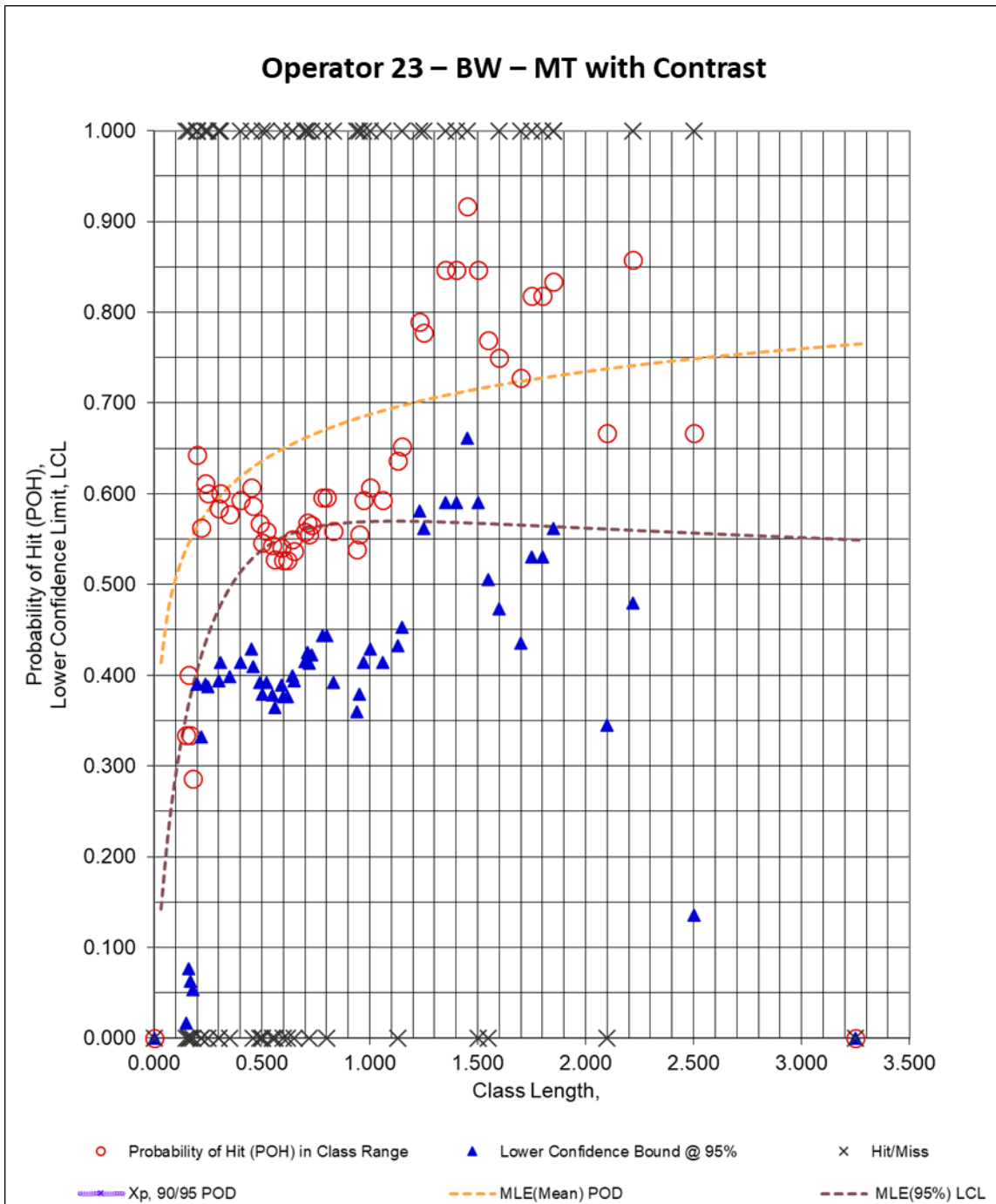


Figure 346. DOEPOD – BW – MT with Contrast – Operator 23

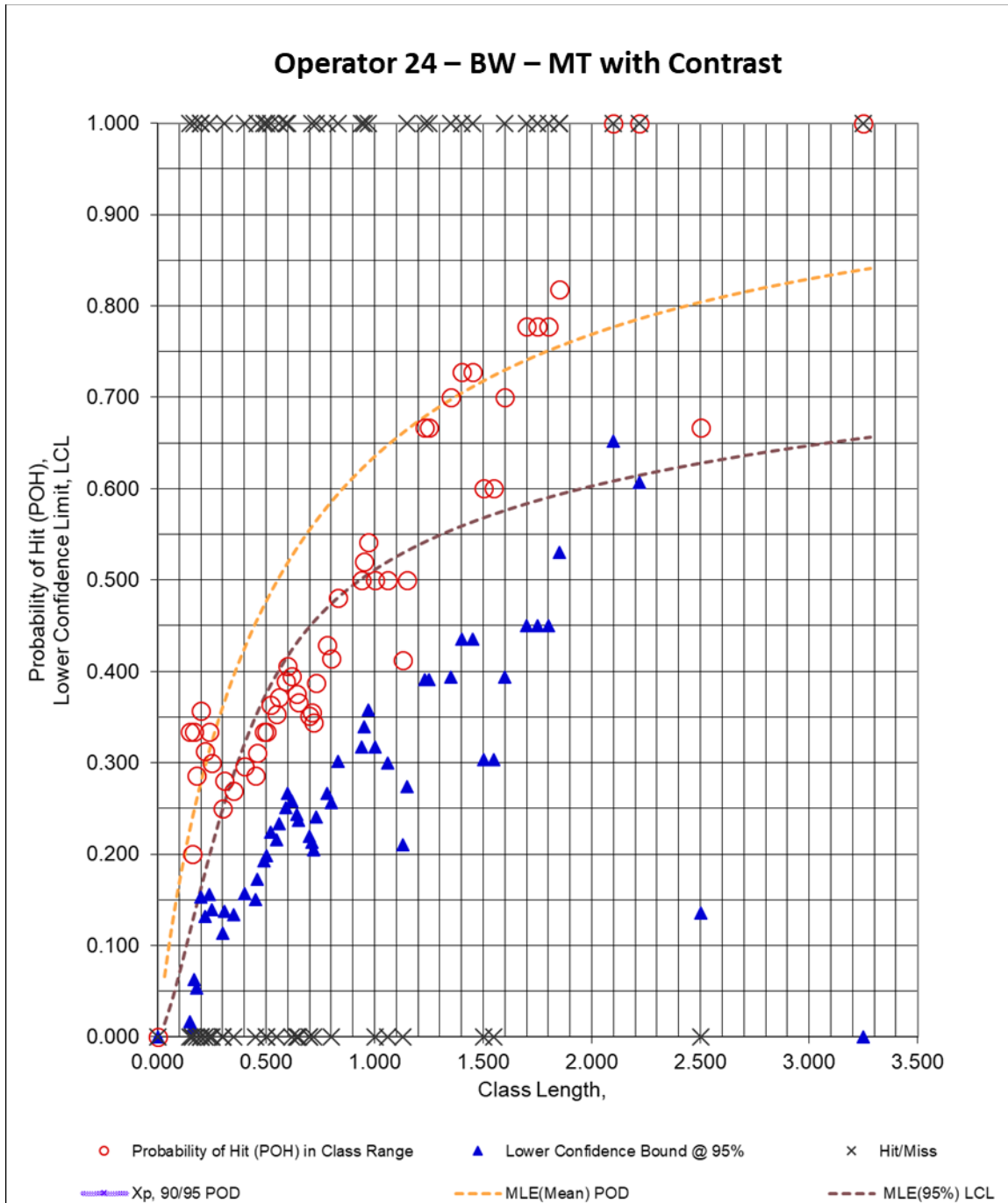


Figure 347. DOEPOD – BW – MT with Contrast – Operator 24

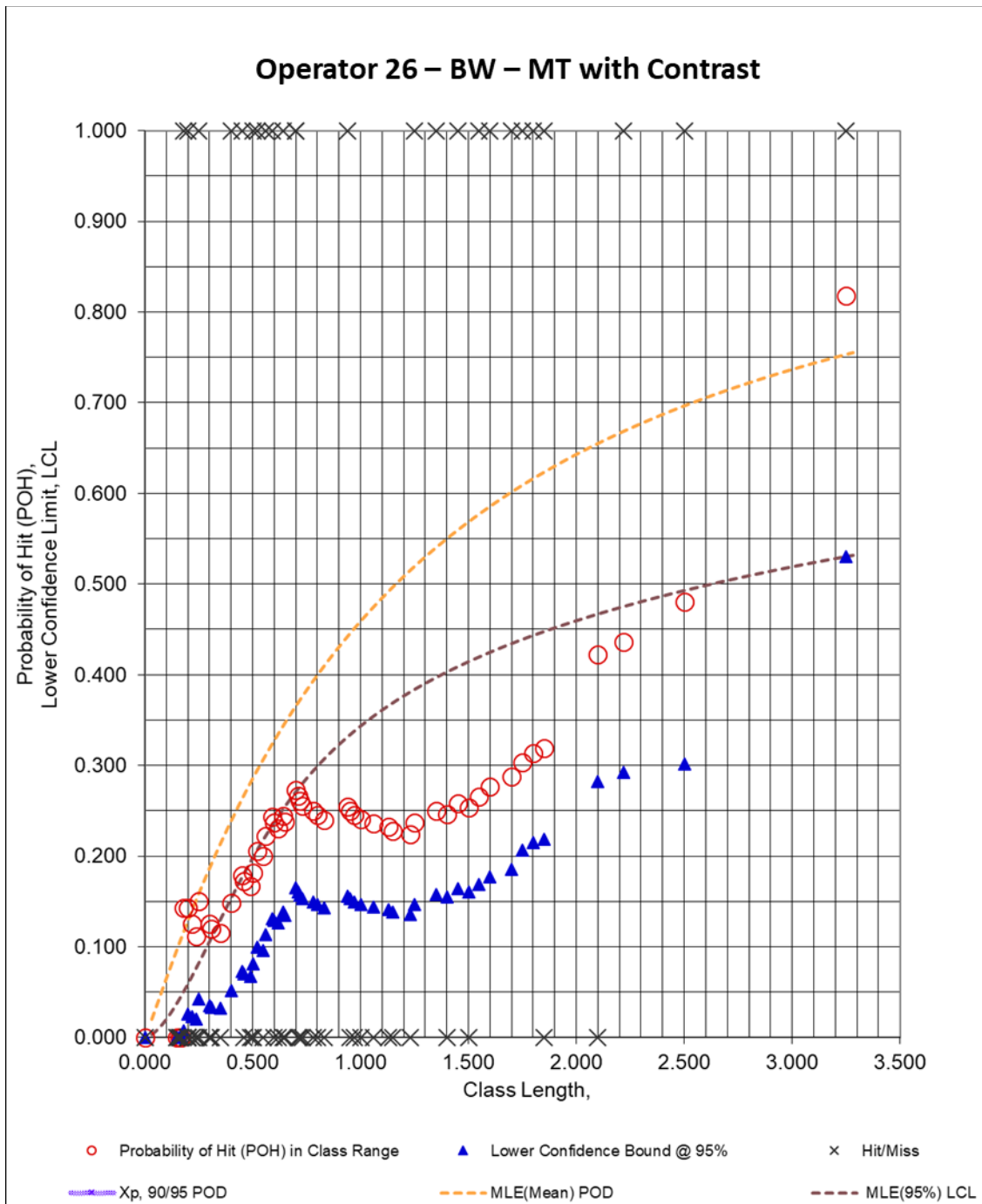


Figure 348. DOEPOD – BW – MT with Contrast – Operator 26

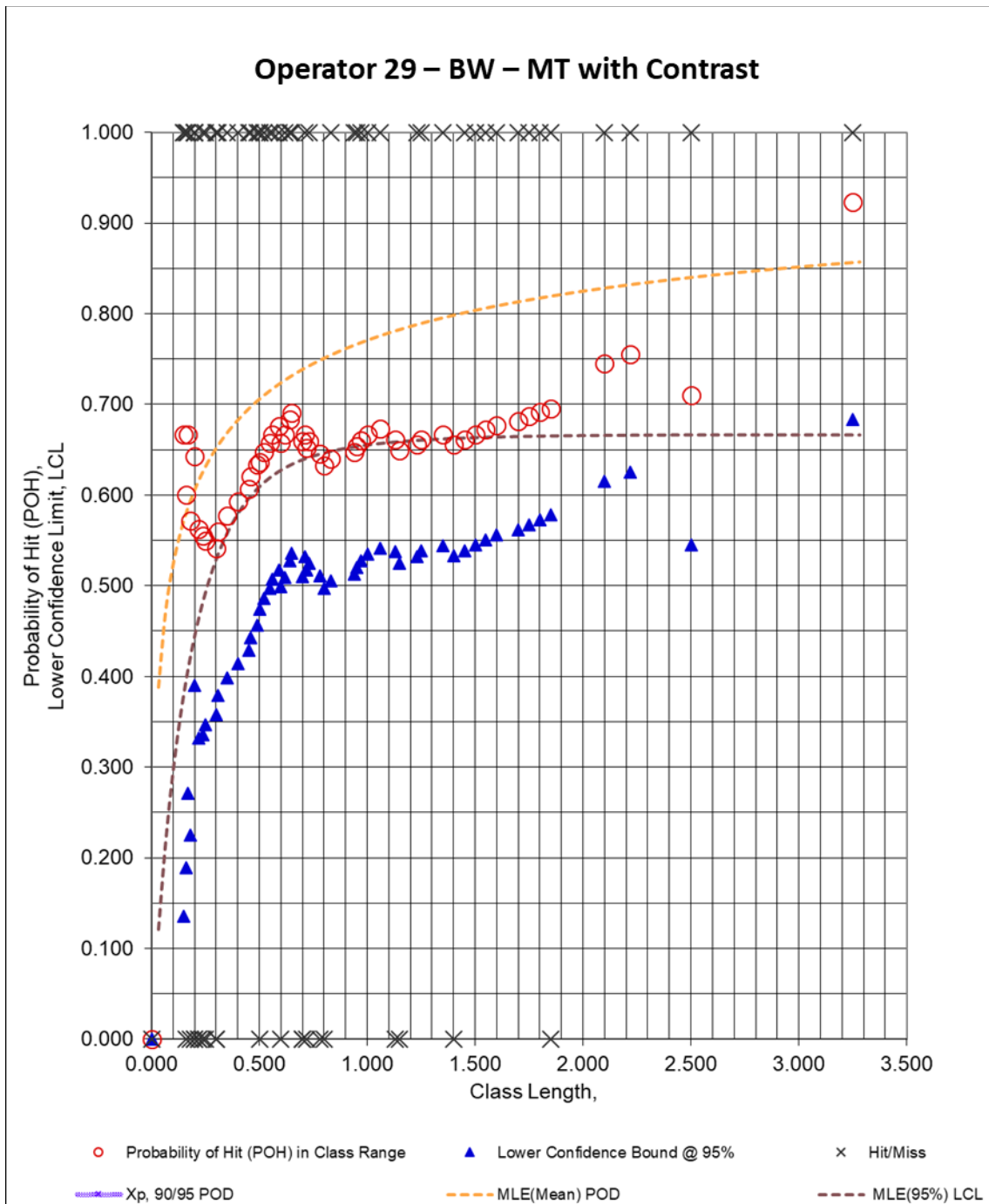


Figure 349. DOEPOD – BW – MT with Contrast – Operator 297

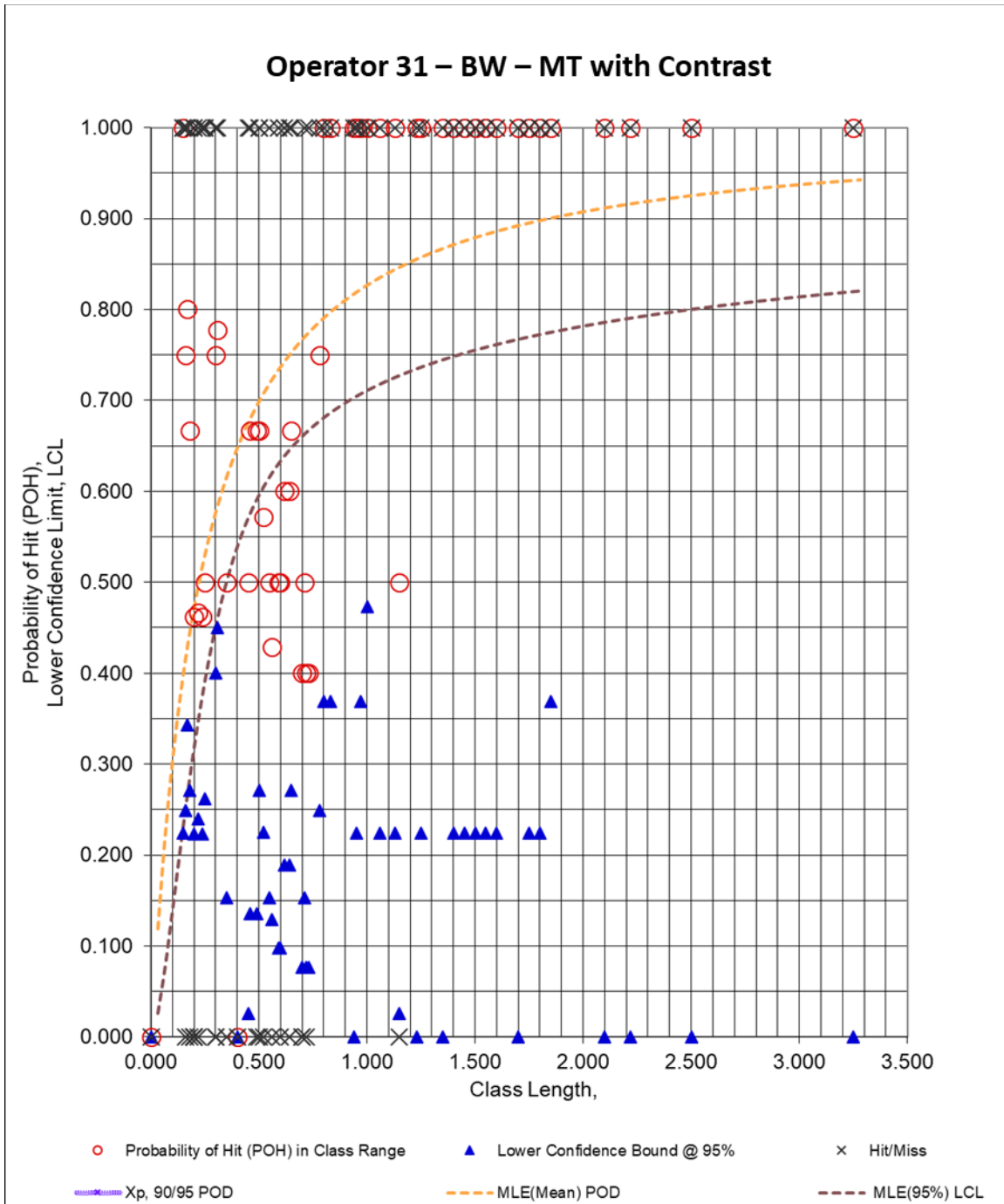


Figure 350. DOEPOD – BW – MT with Contrast – Operator 31

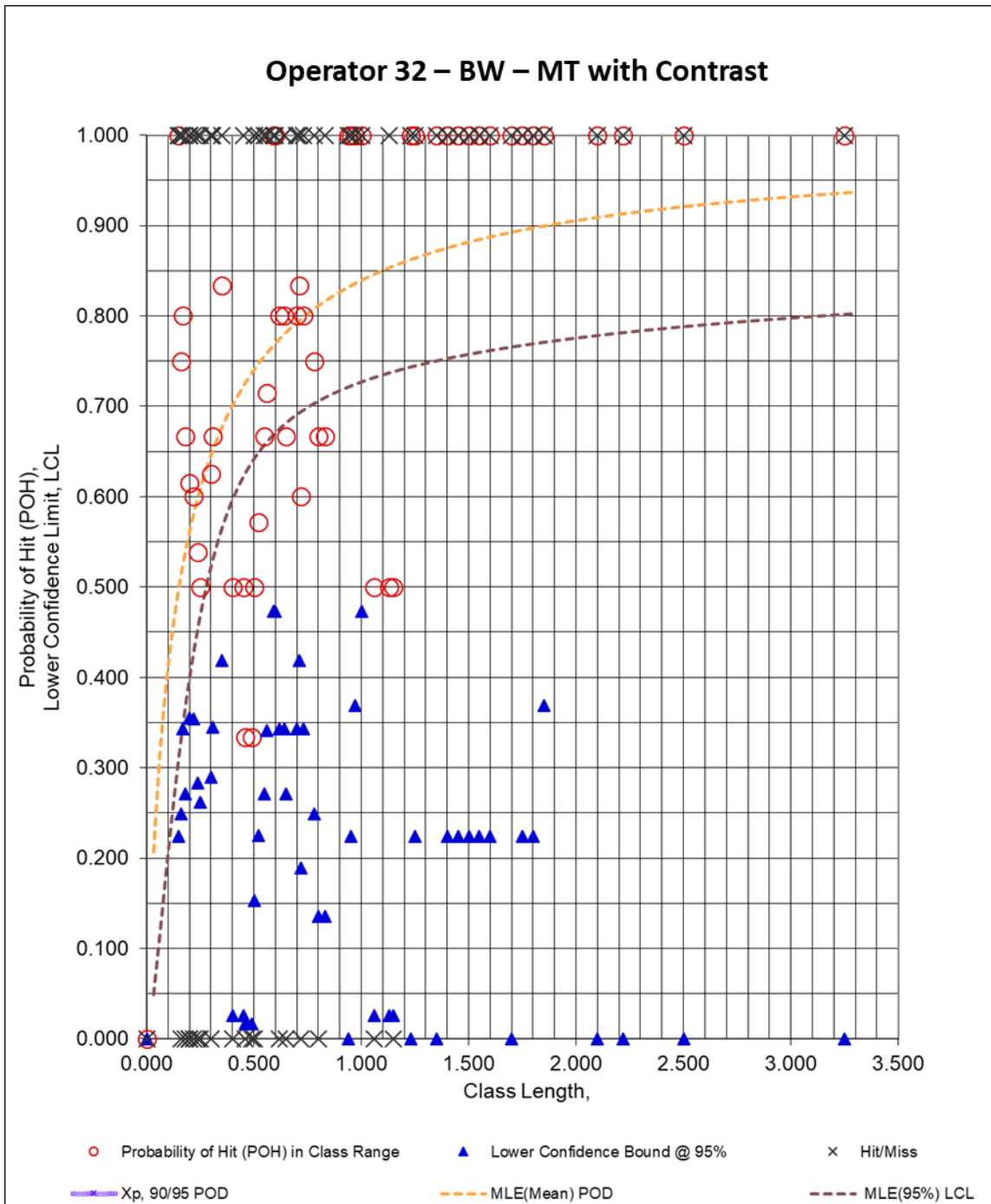


Figure 351. DOEPOD – BW – MT with Contrast – Operator 32

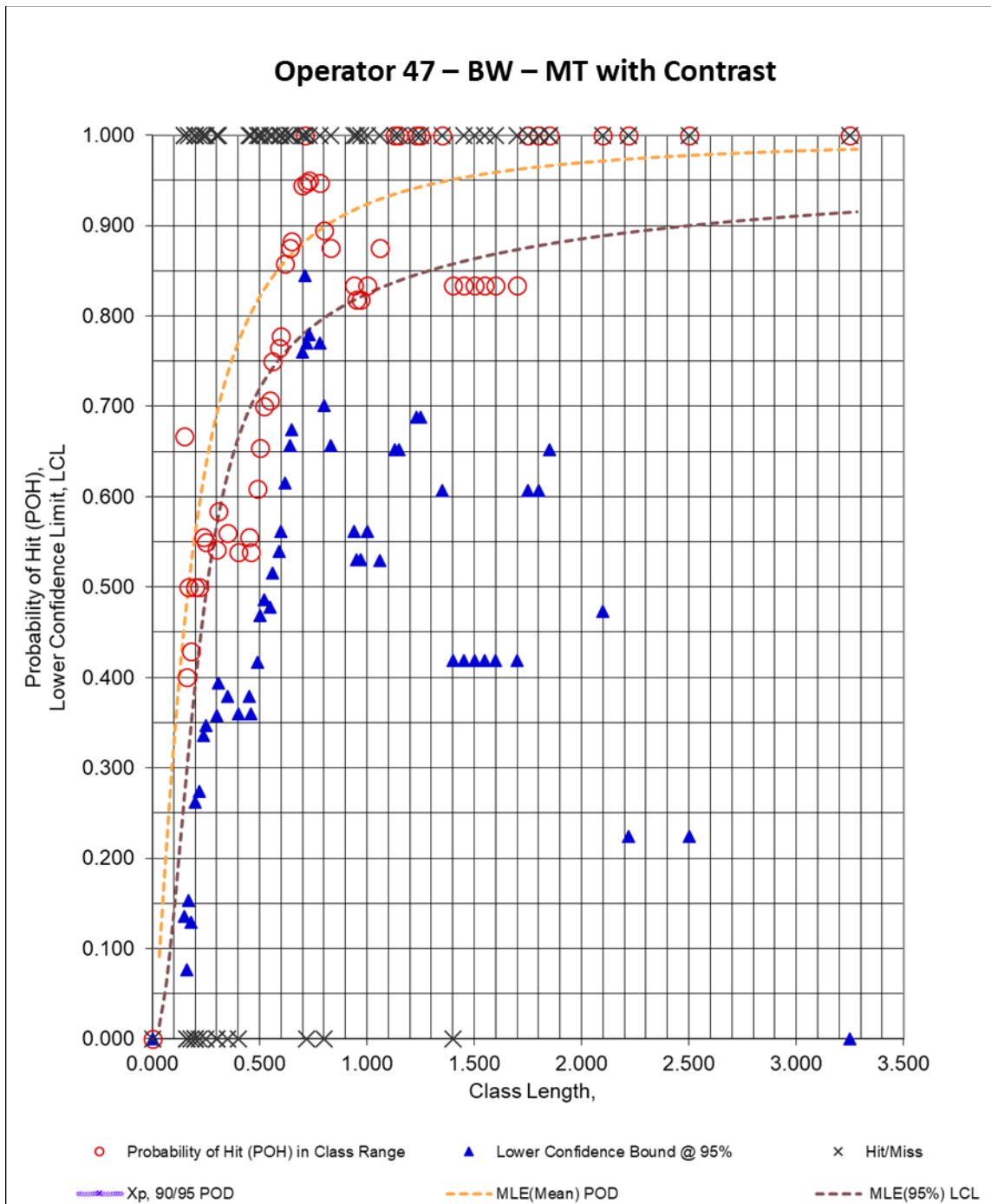


Figure 352. DOEPOD – BW – MT with Contrast – Operator 47

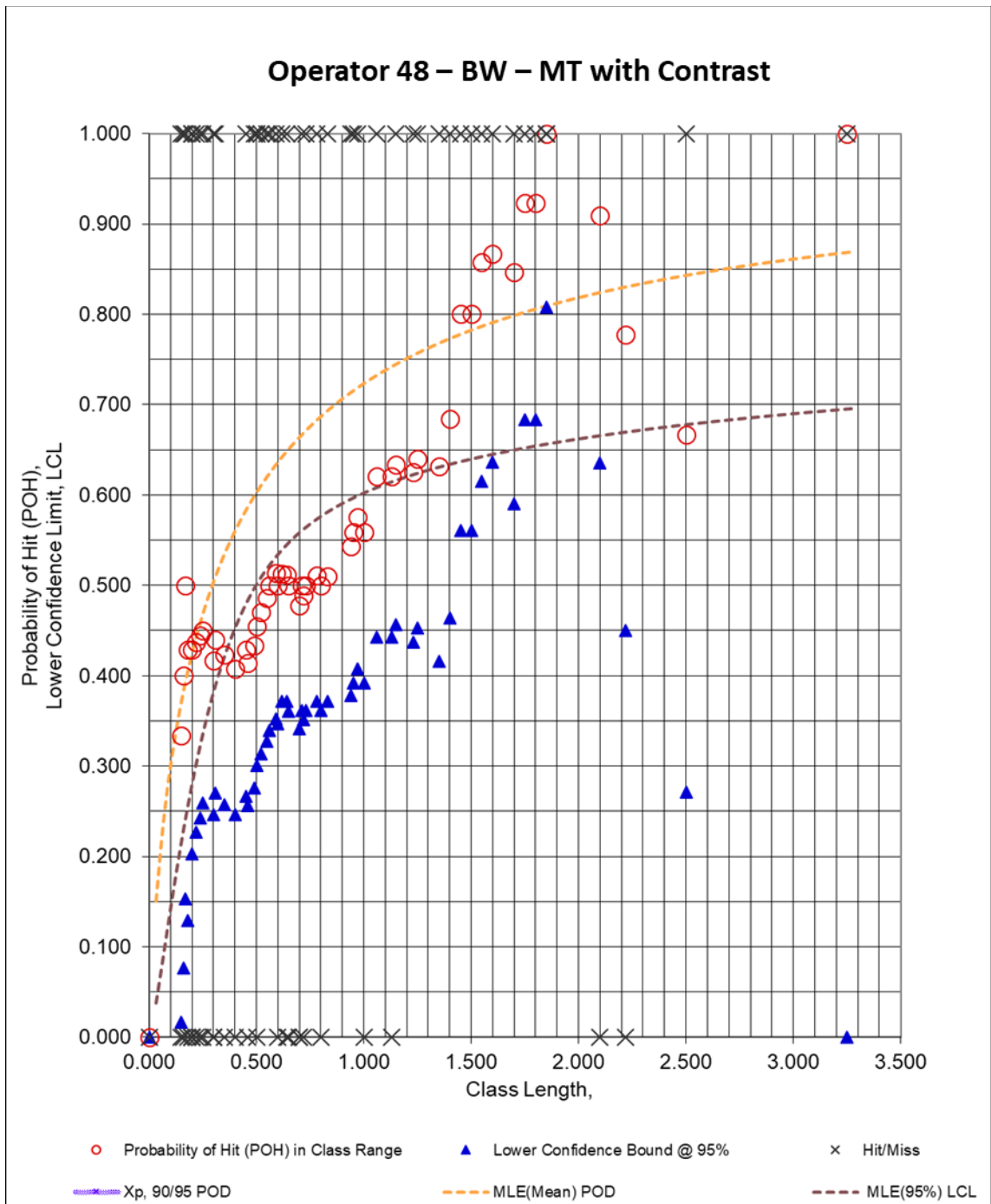


Figure 353. DOEPOD – BW – MT with Contrast – Operator 48

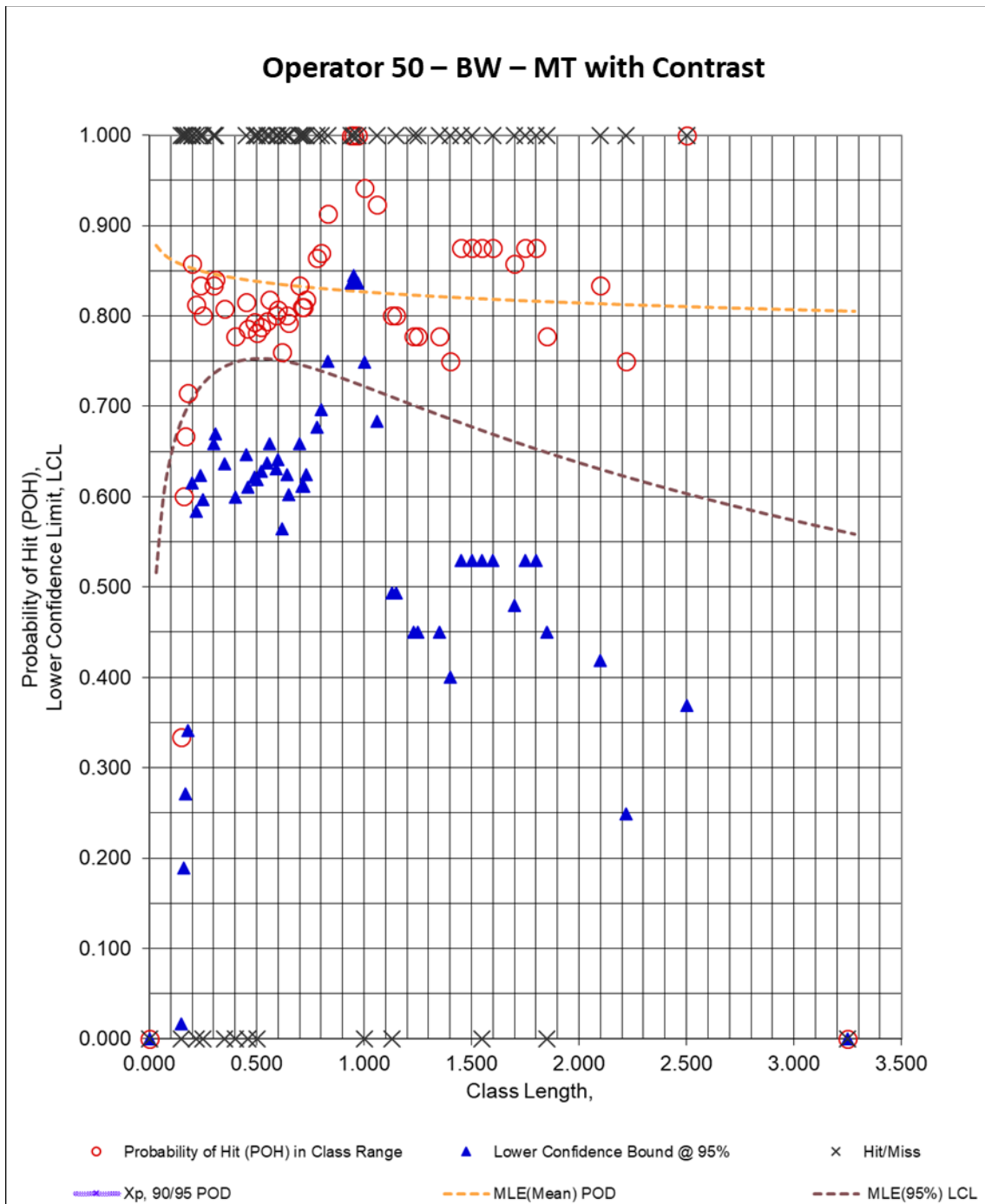


Figure 354. DOEPOD – BW – MT with Contrast – Operator 50

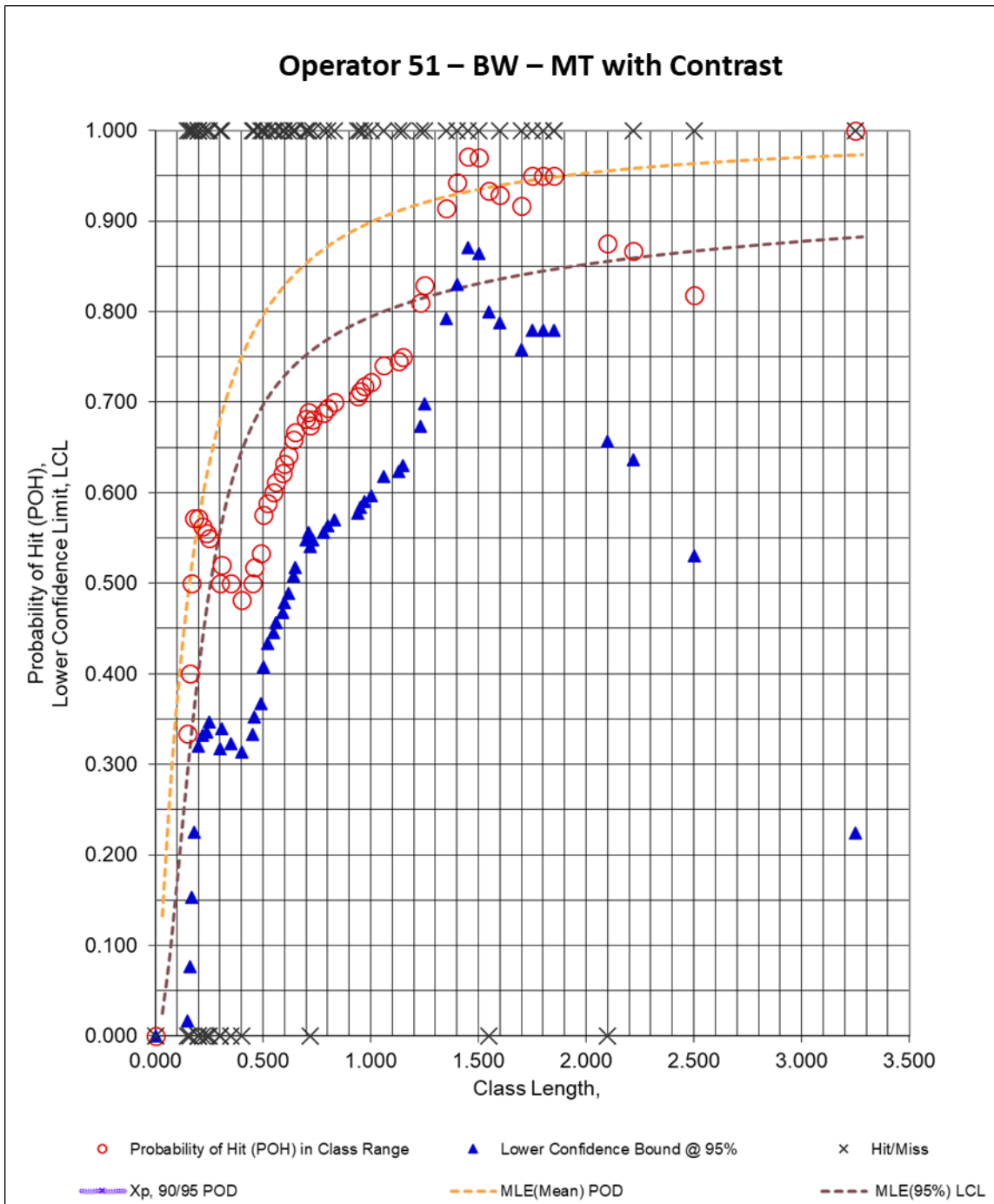


Figure 355. DOEPOD – BW – MT with Contrast – Operator 51

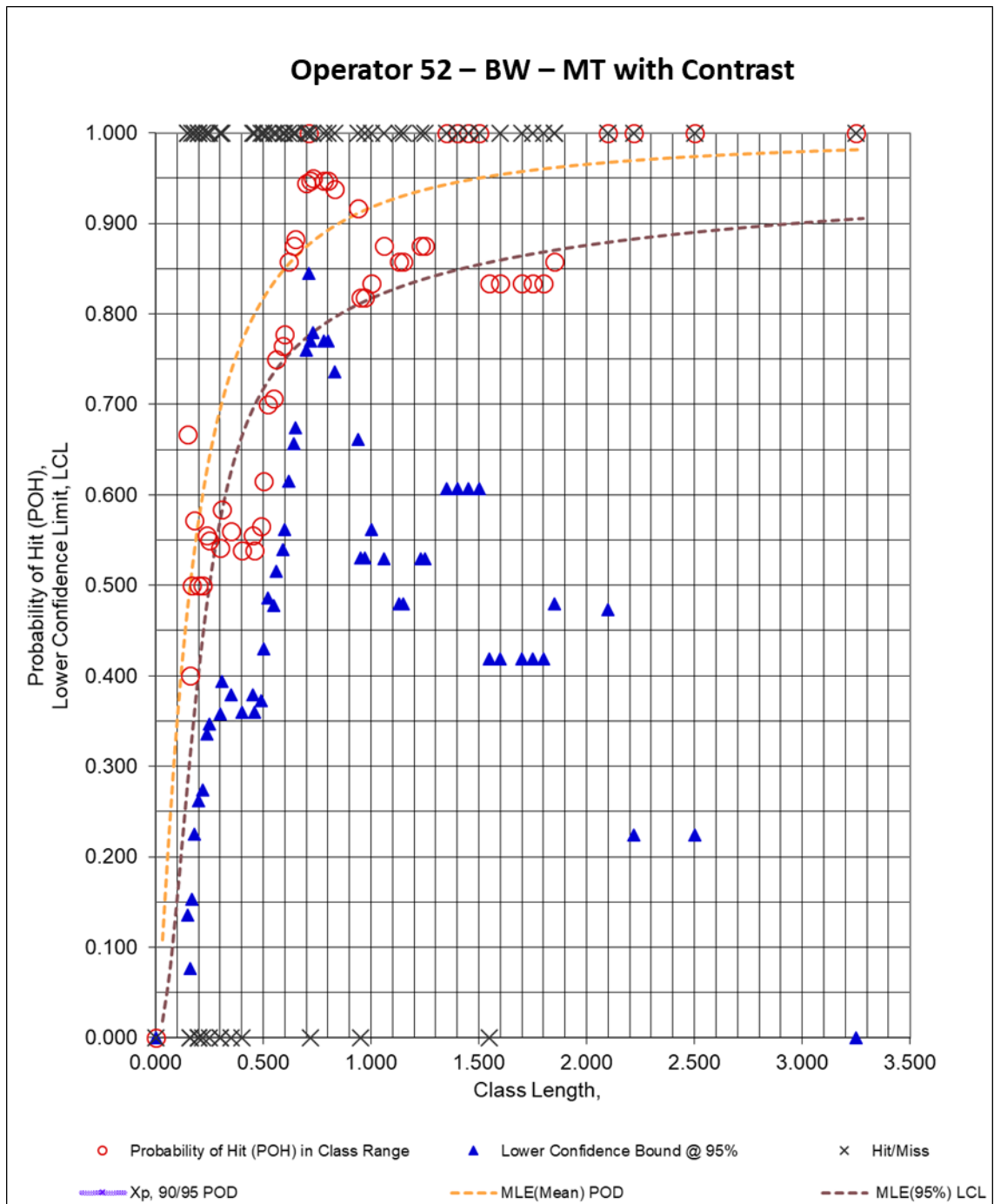


Figure 356. DOEPOD – BW – MT with Contrast – Operator 52

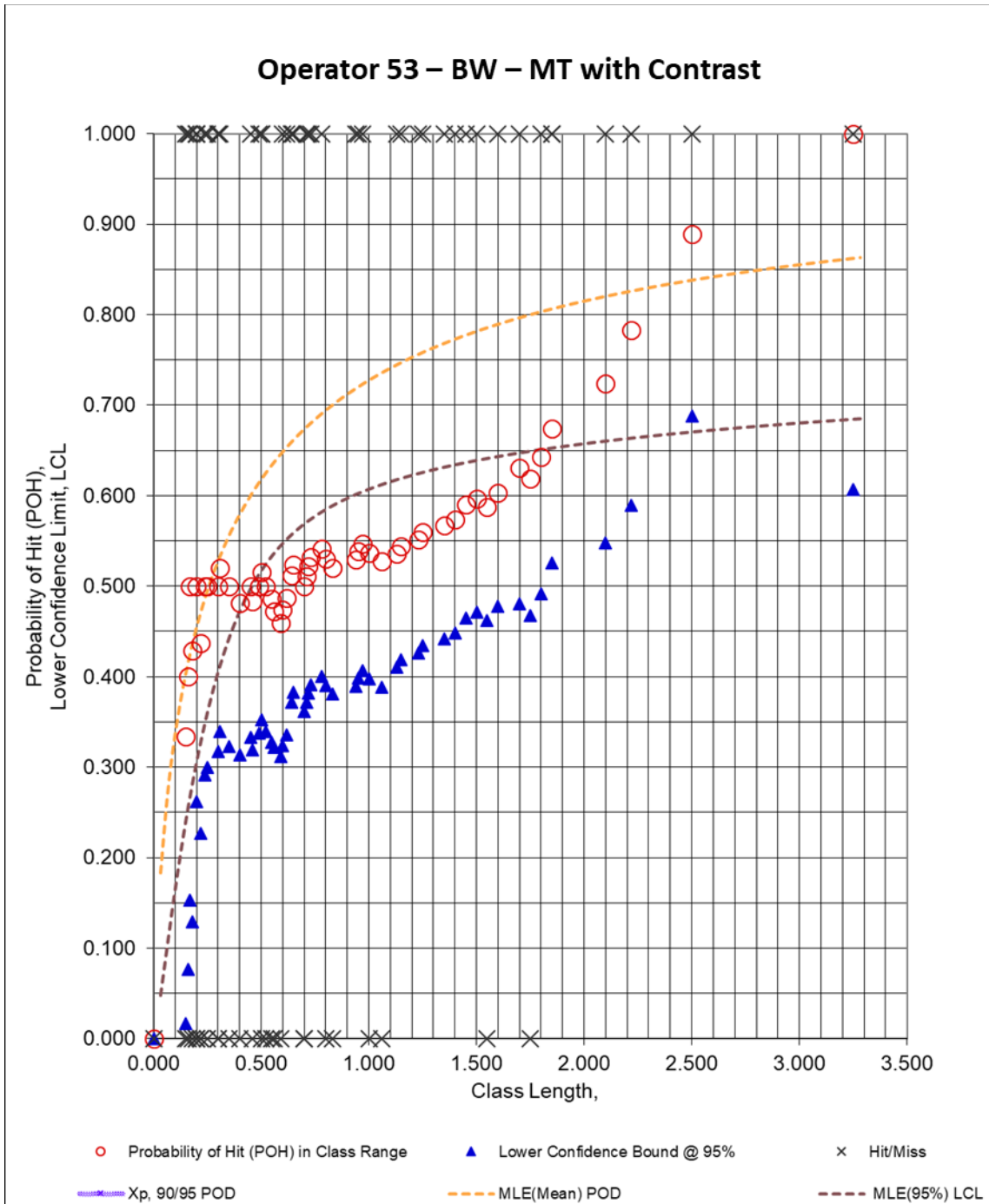


Figure 357. DOEPOD – BW – MT with Contrast – Operator 53

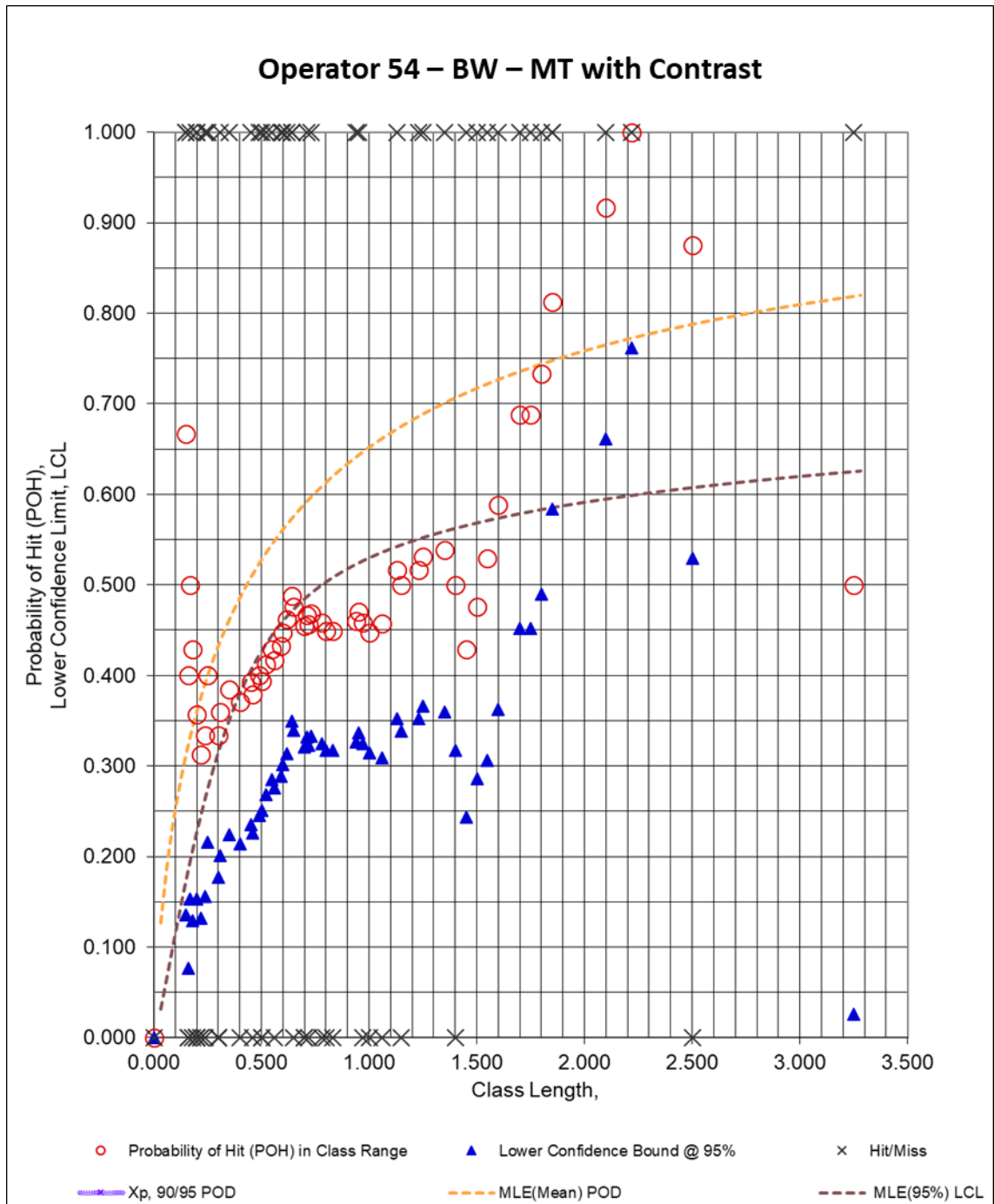


Figure 358. DOEPOD – BW – MT with Contrast – Operator 54

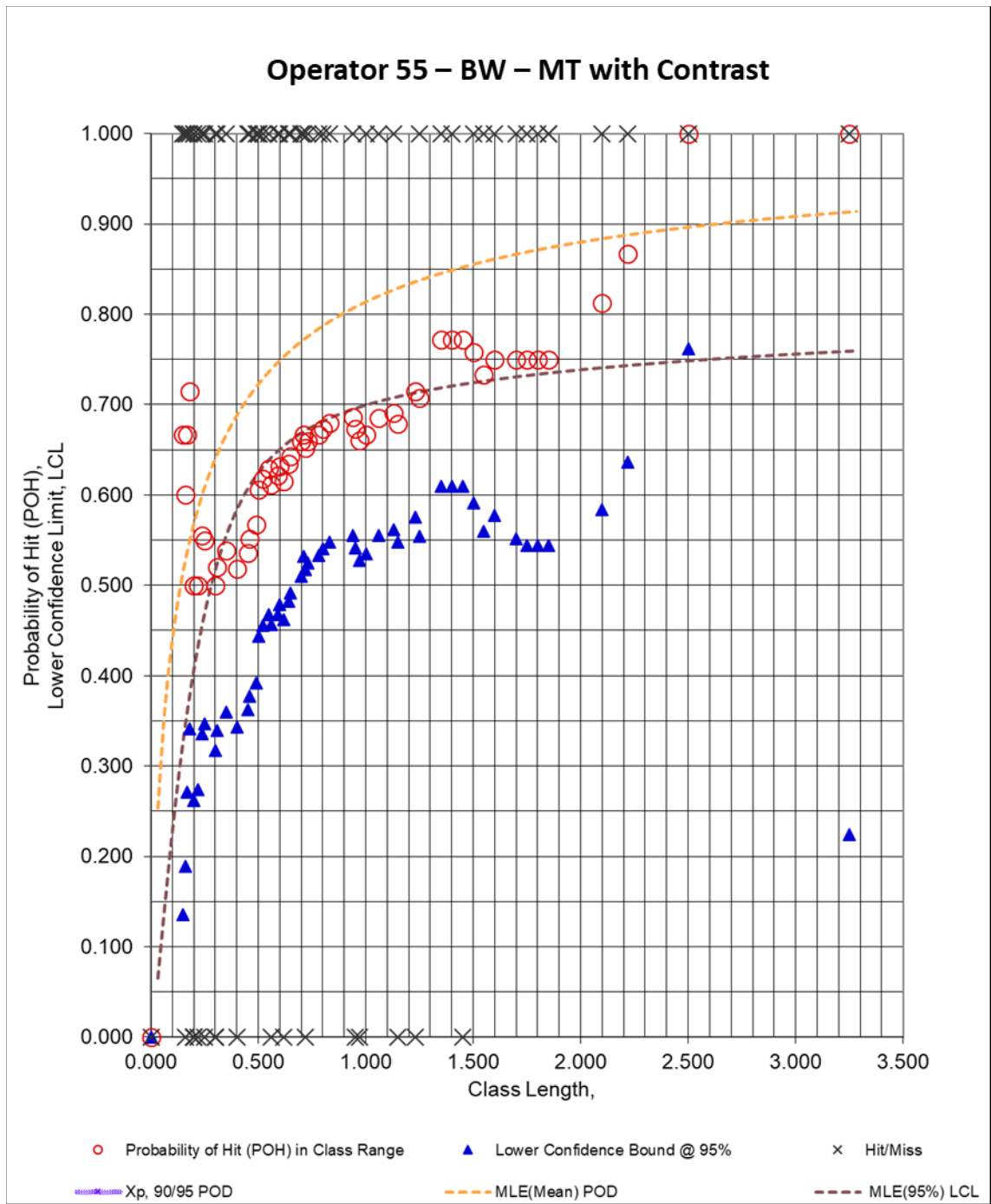


Figure 359. DOEPOD – BW – MT with Contrast – Operator 55

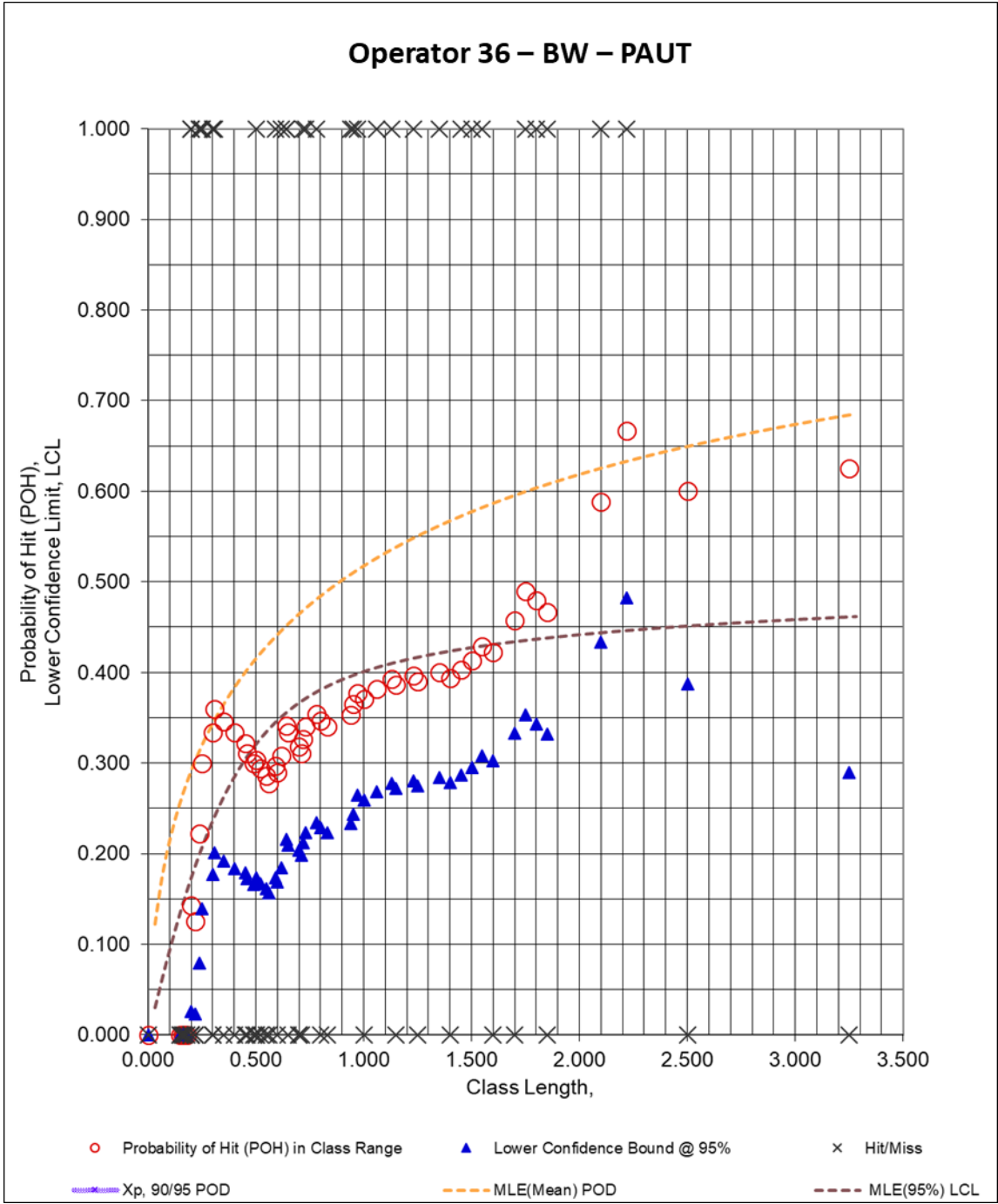


Figure 360. DOEPOD – BW – PAUT – Operator 36

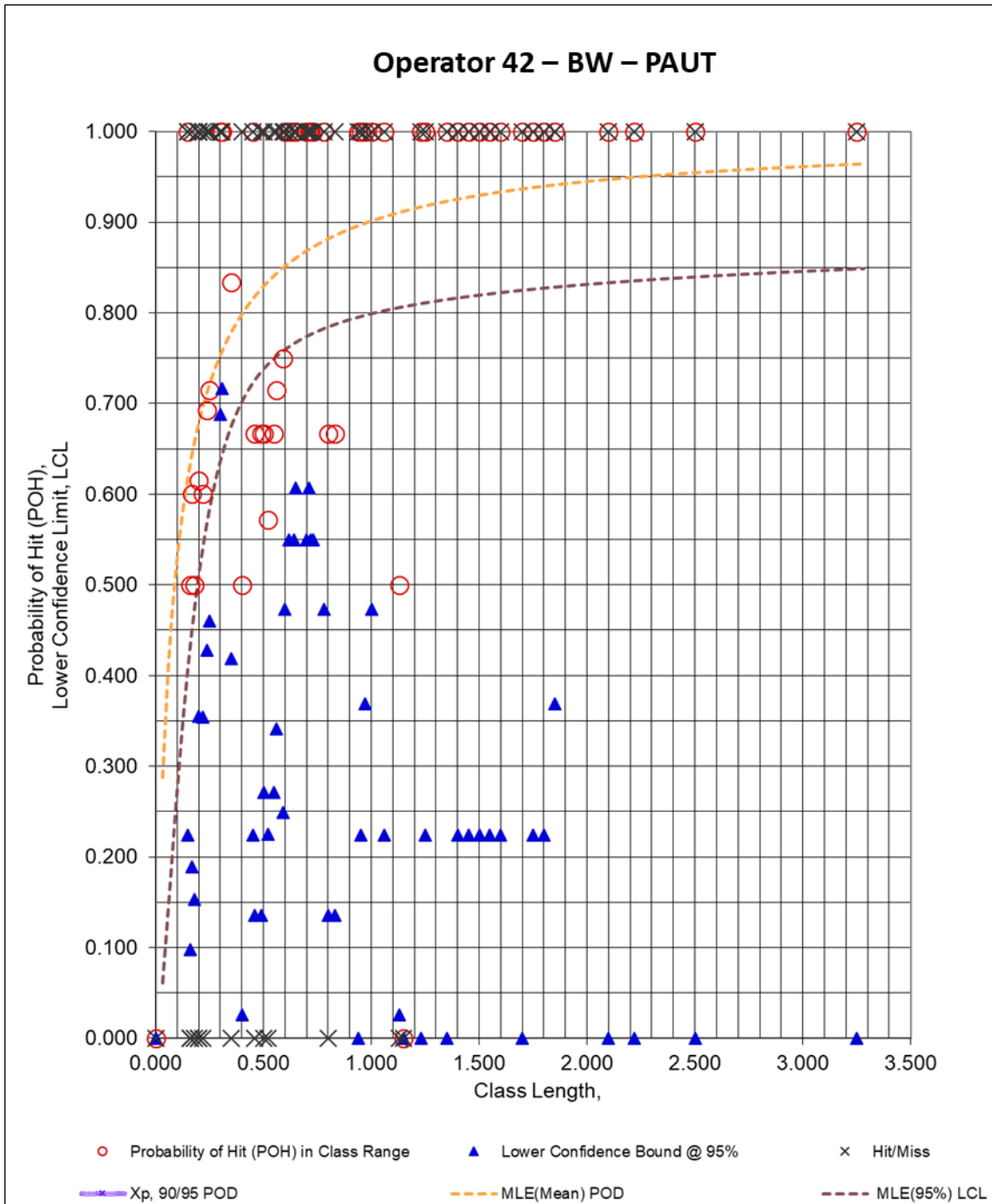


Figure 361. DOEPOD – BW – PAUT – Operator 42

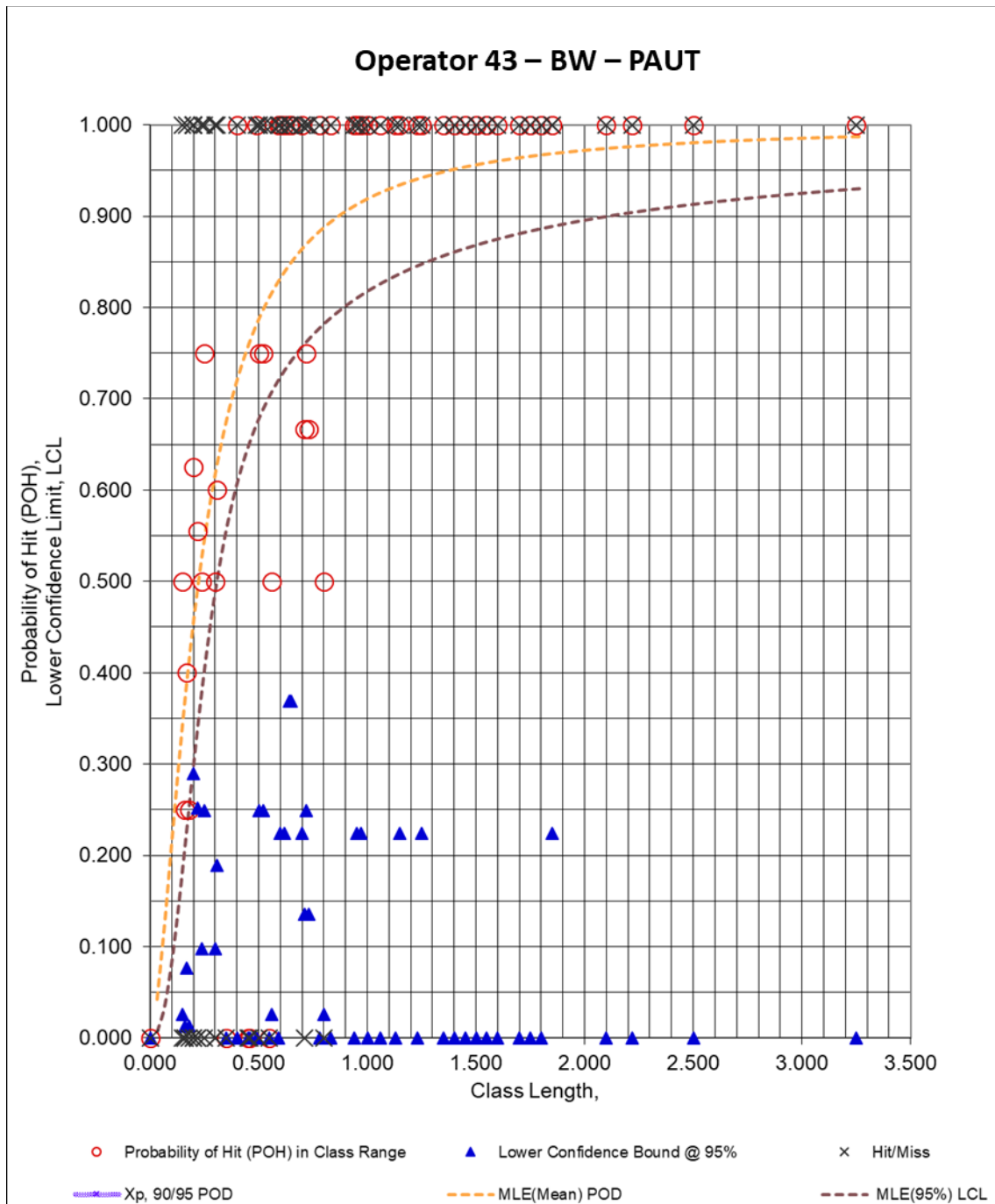


Figure 362. DOEPOD – BW – PAUT – Operator 43

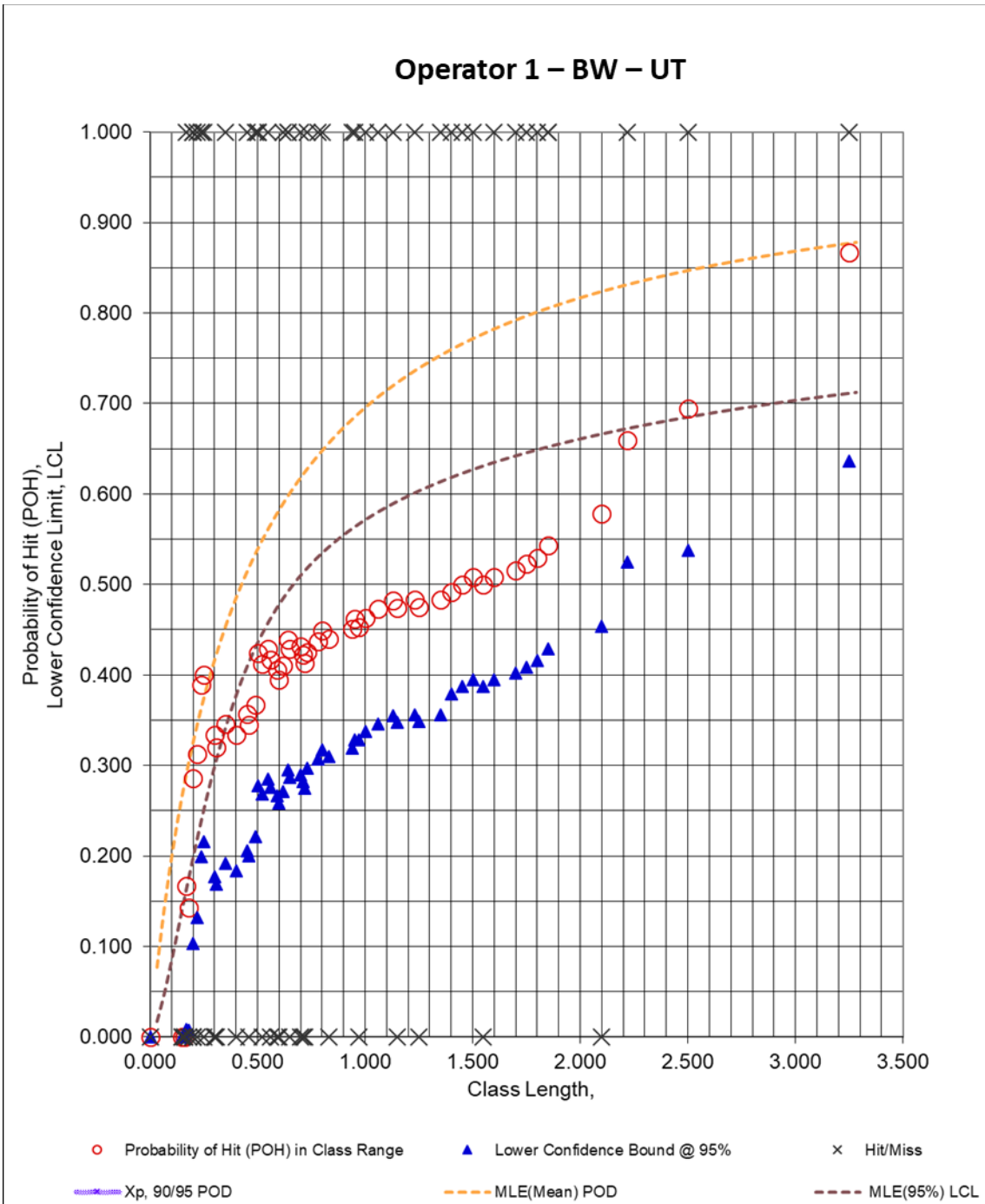


Figure 363. DOEPOD – BW – UT – Operator 1

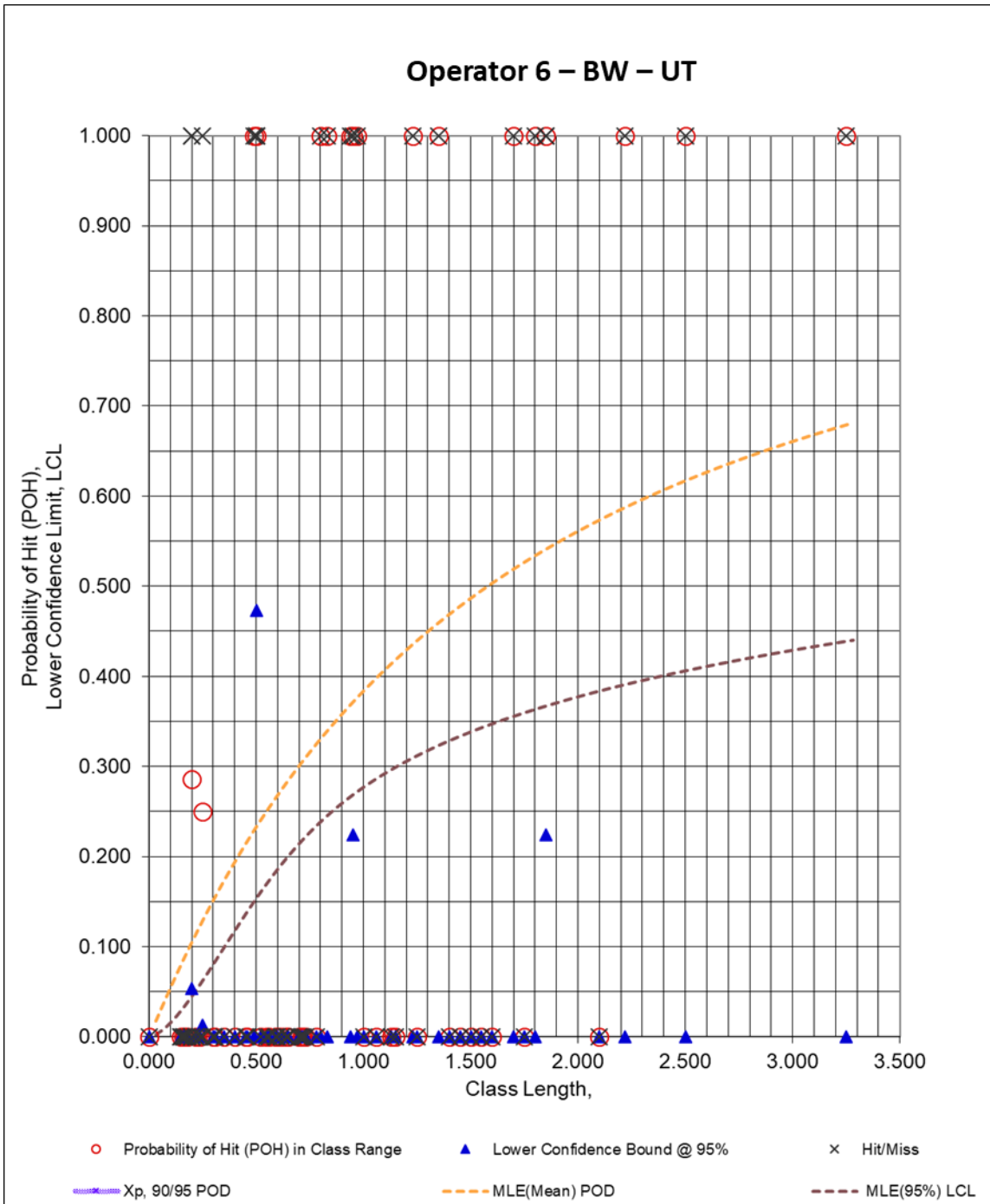


Figure 364. DOEPOD – BW – UT – Operator 6

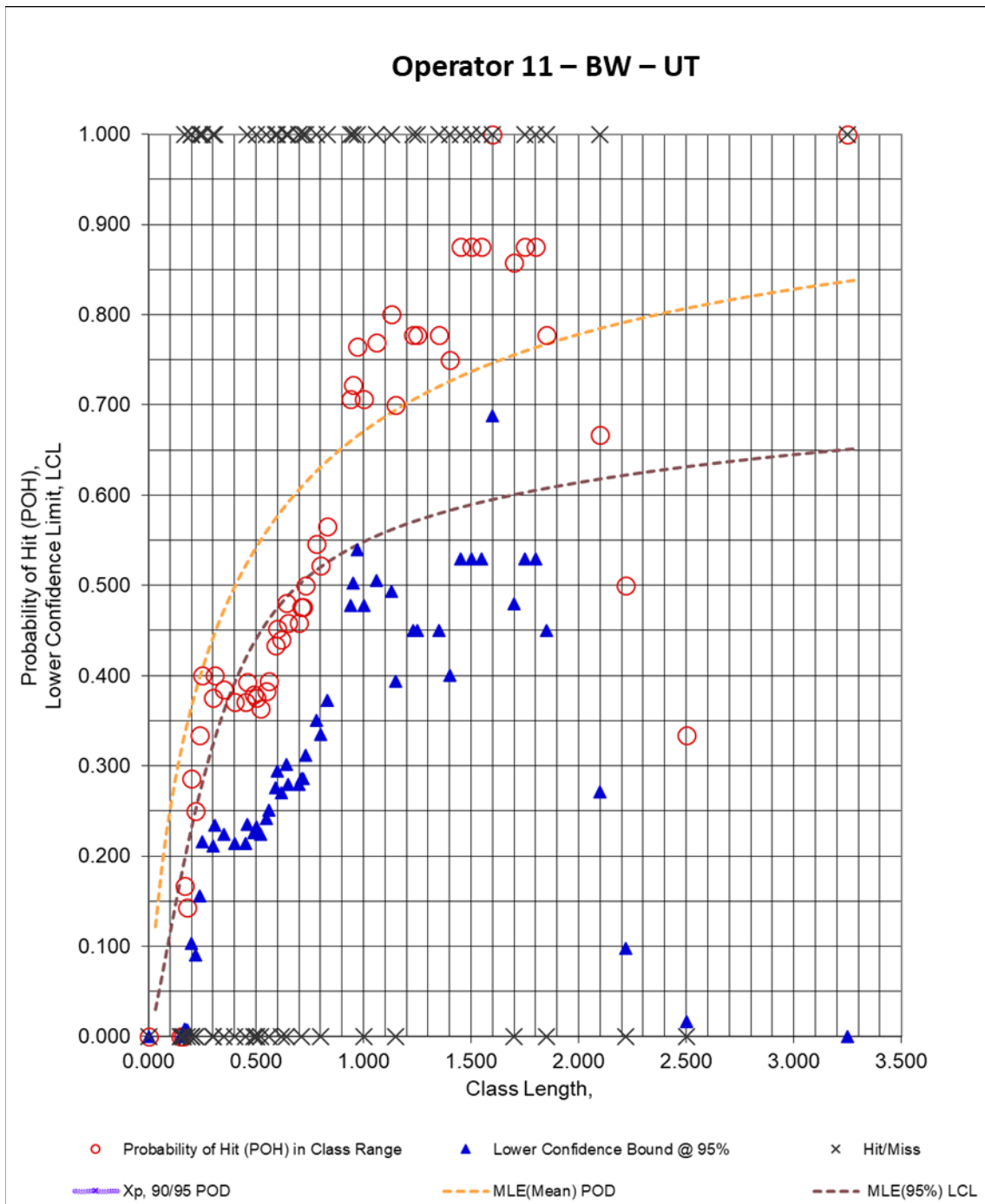


Figure 365. DOEPOD – BW – UT – Operator 11

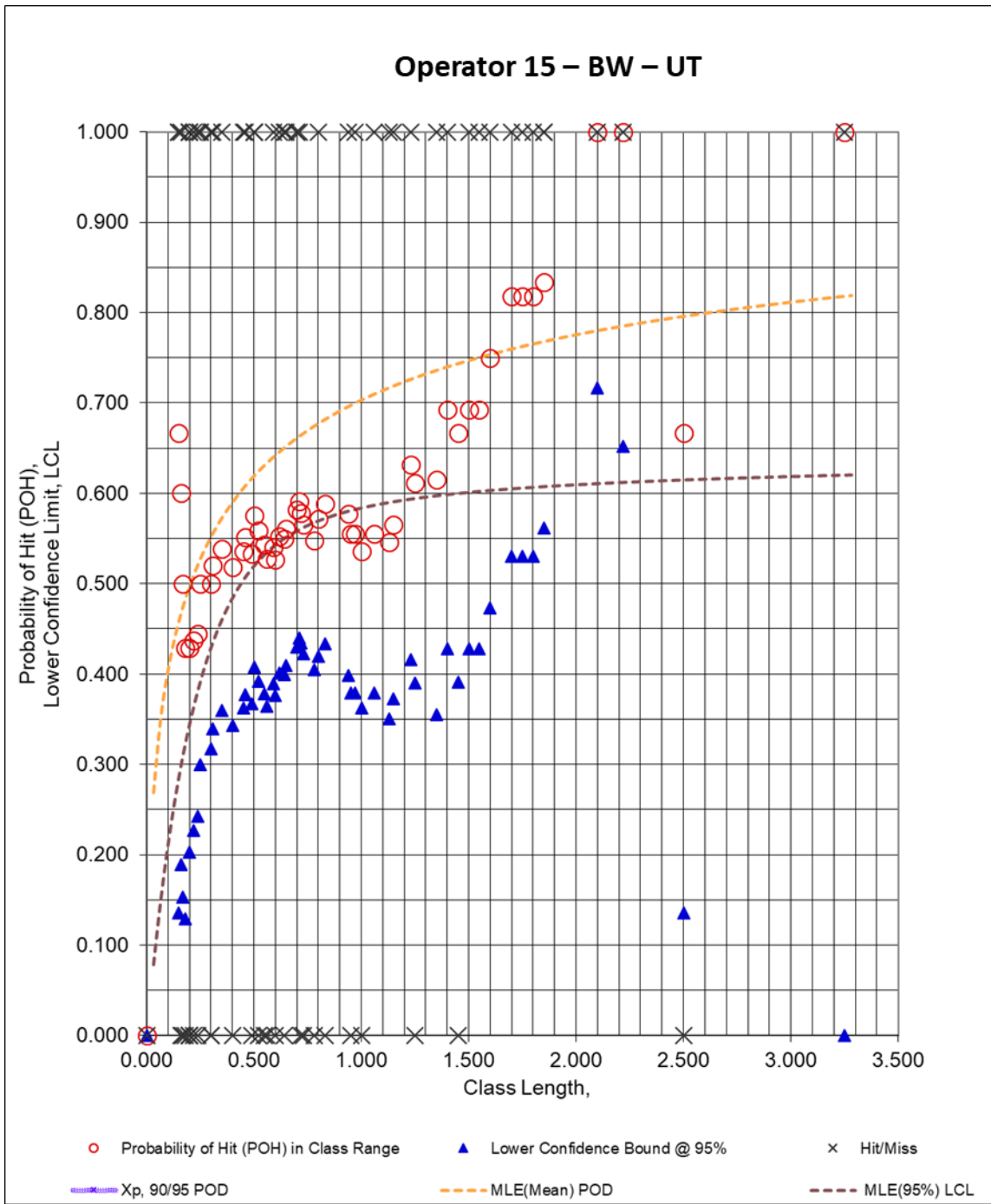


Figure 366. DOEPOD – BW – UT – Operator 15

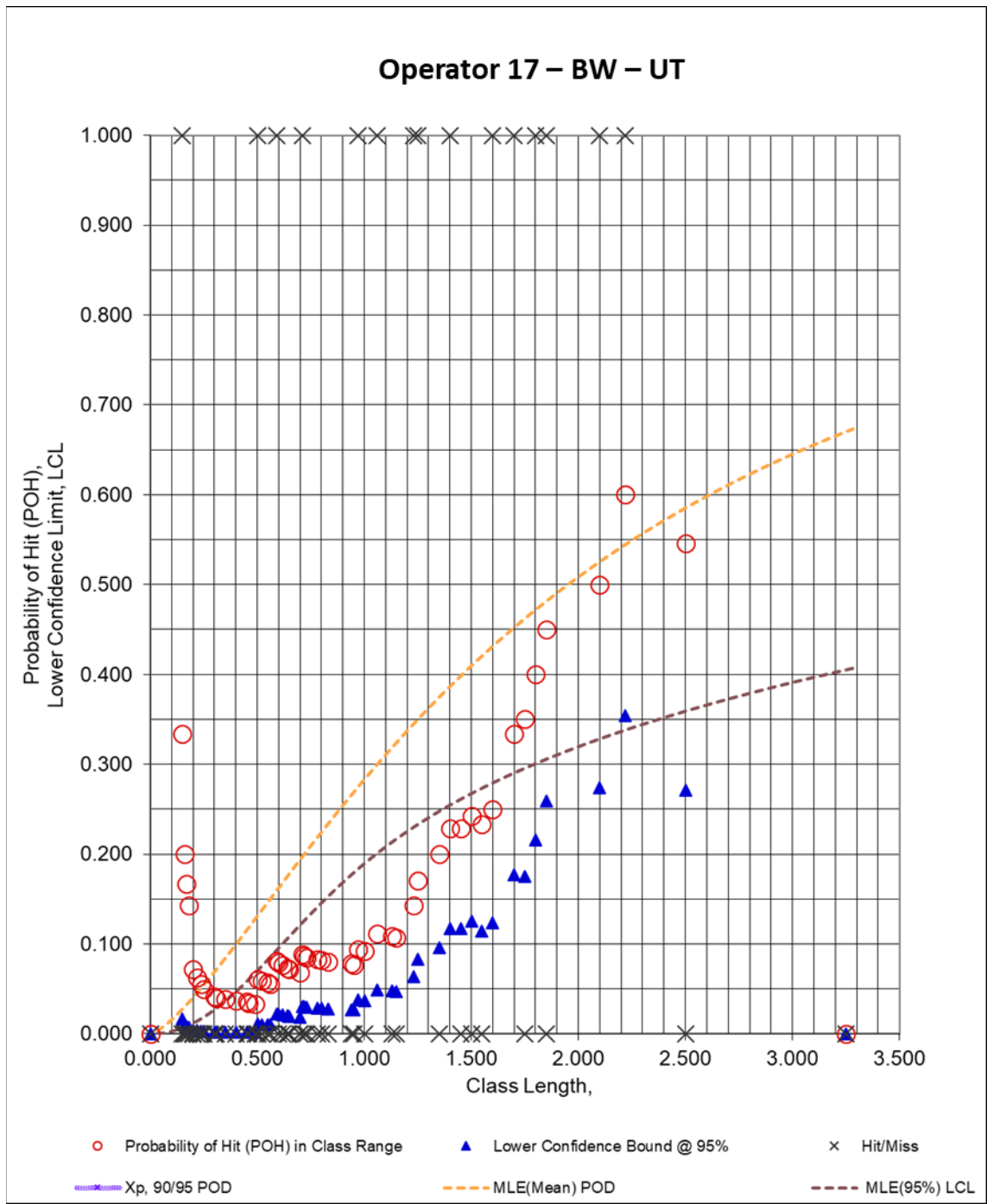


Figure 367. DOEPOD – BW – UT – Operator 17

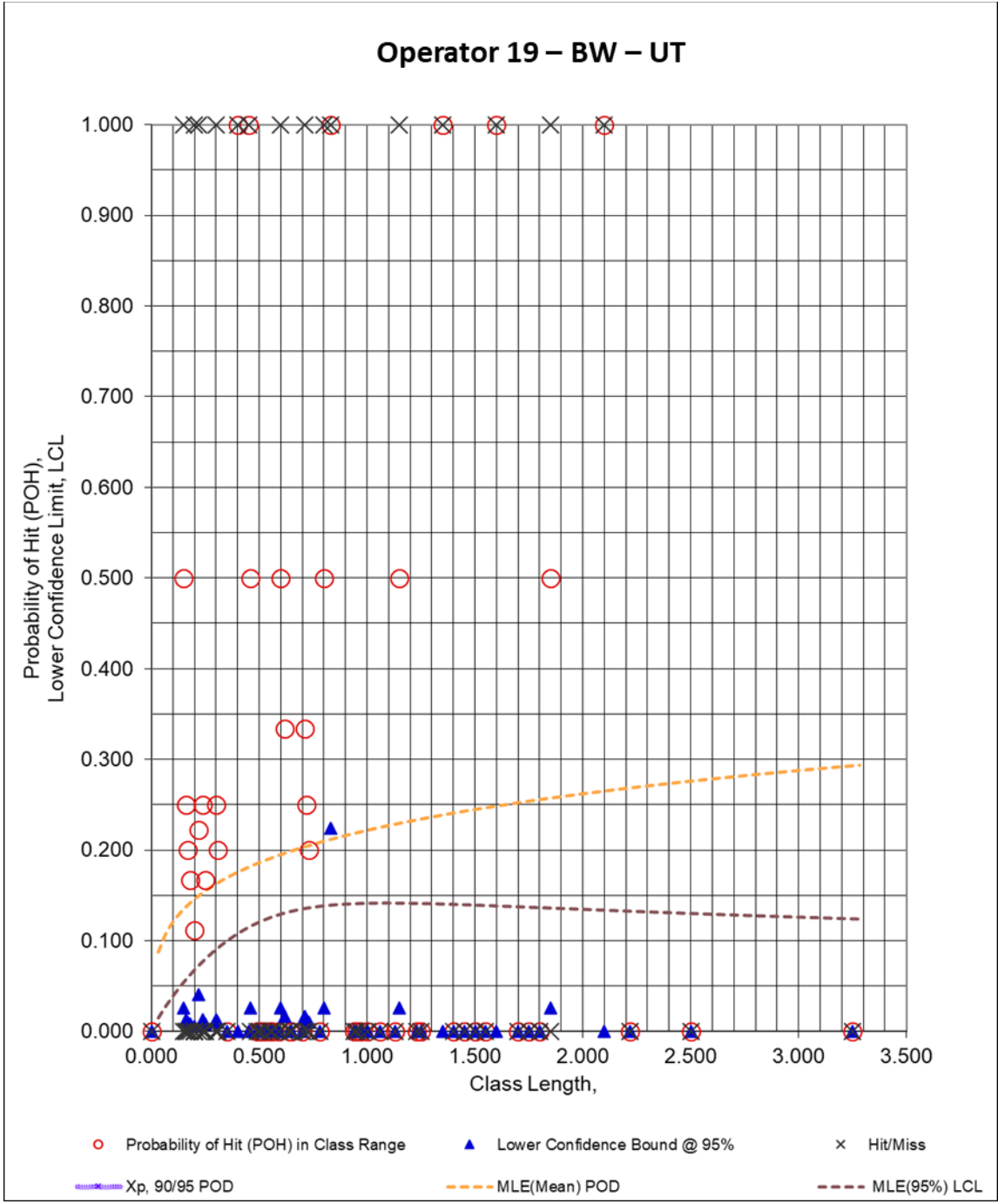


Figure 368. DOEPOD – BW – UT – Operator 19

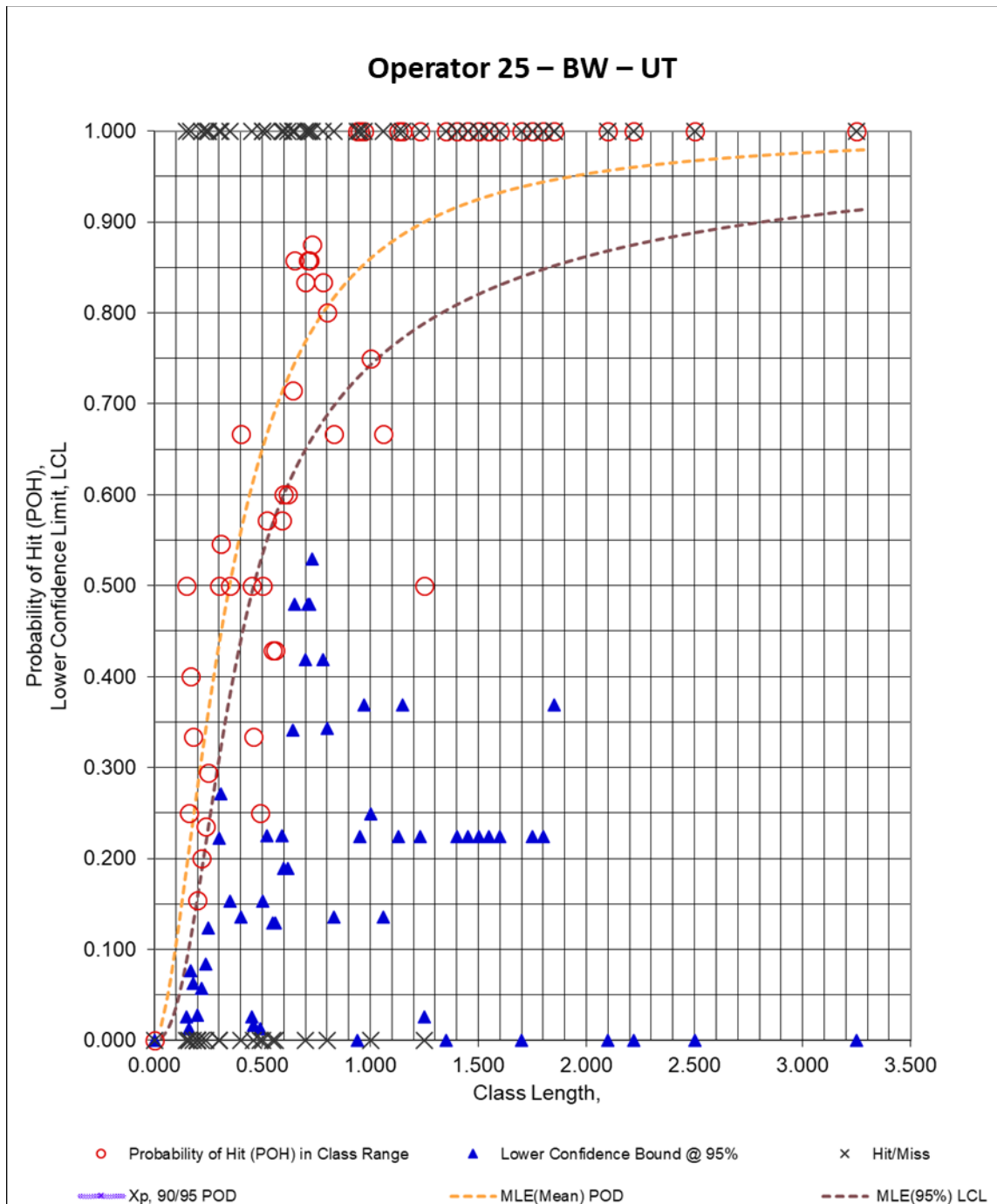


Figure 369. DOEPOD – BW – UT – Operator 25

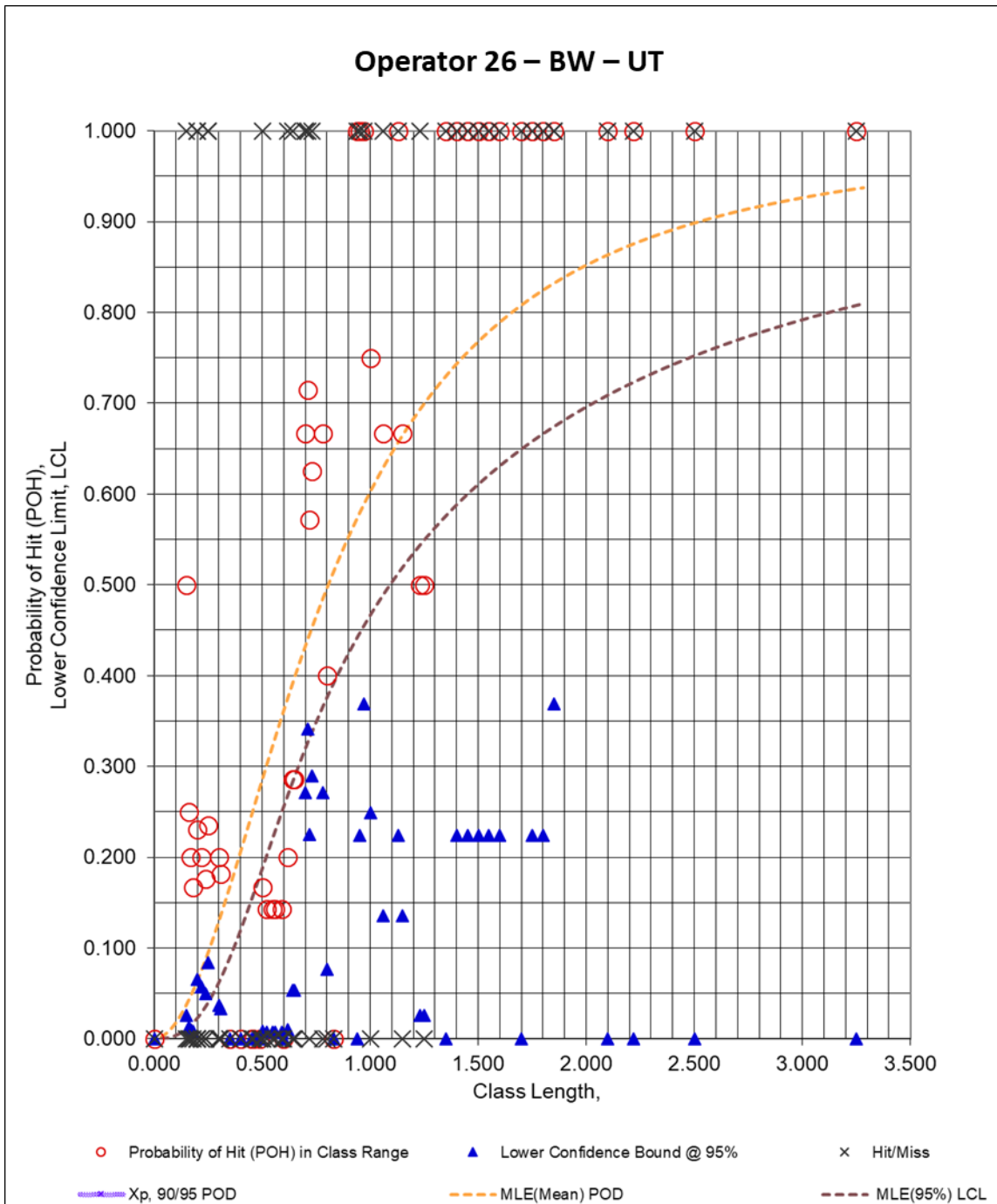


Figure 370. DOEPOD – BW – UT – Operator 26

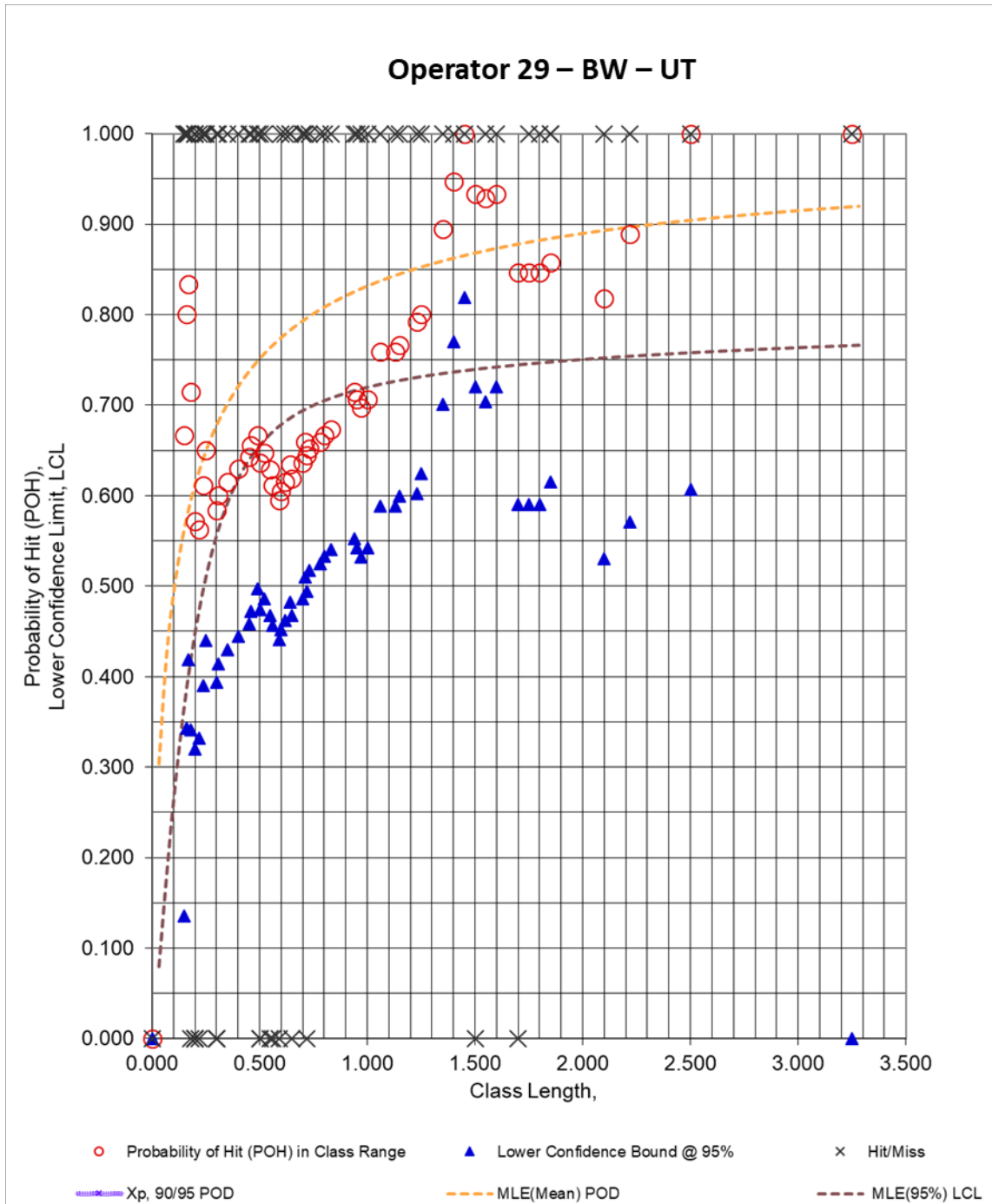


Figure 371. DOEPOD – BW – UT – Operator 29

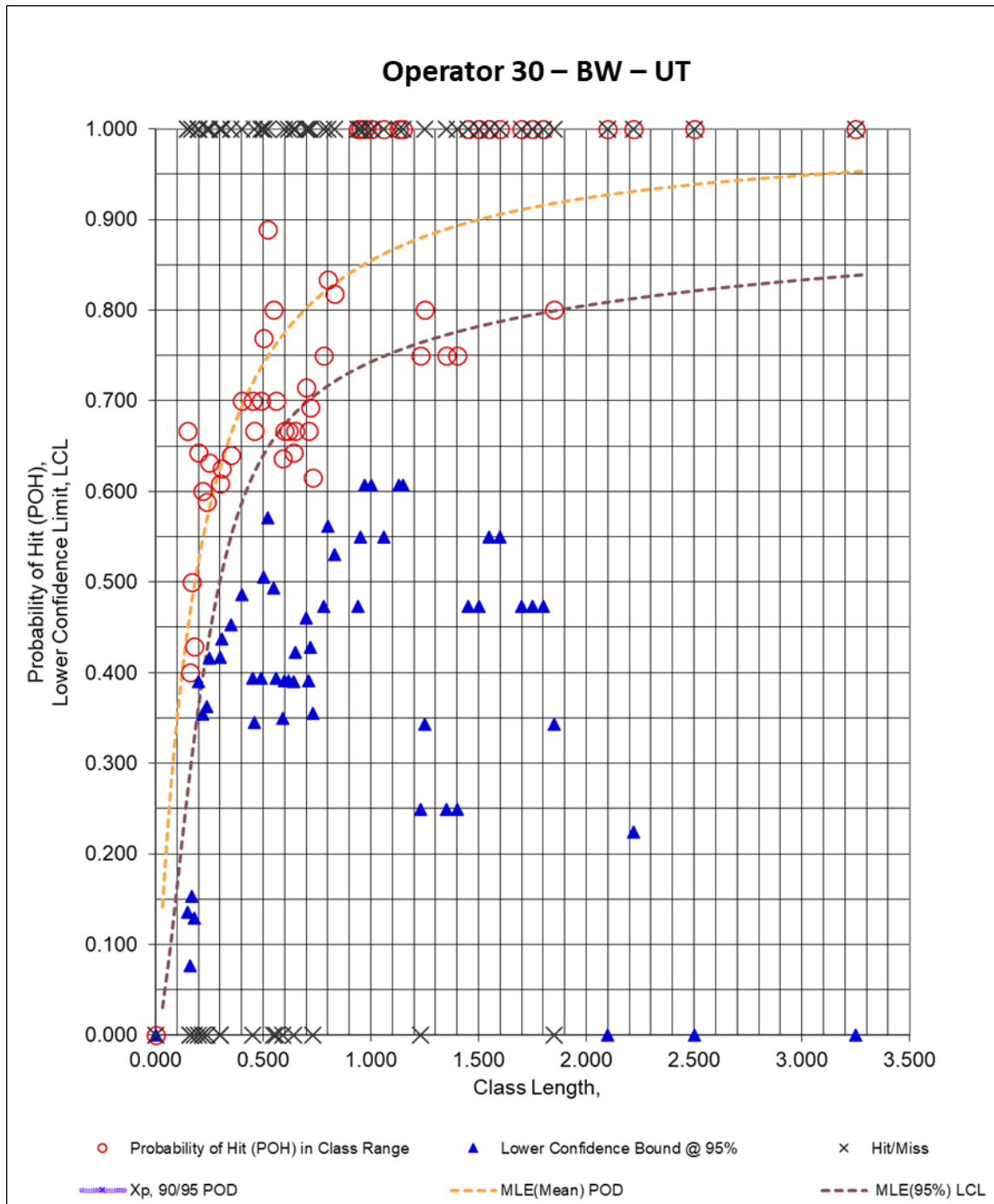


Figure 372. DOEPOD – BW – UT – Operator 30

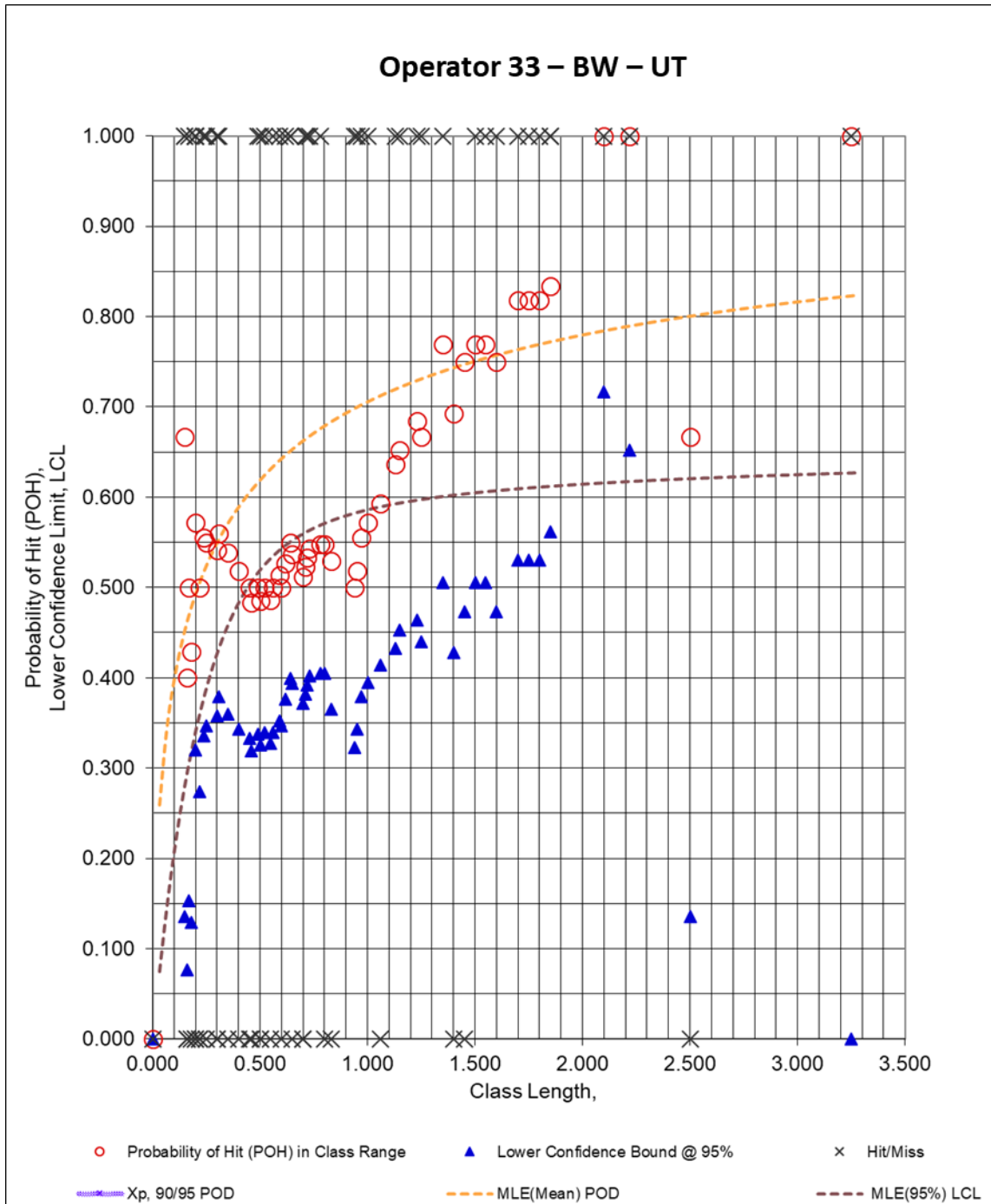


Figure 373. DOEPOD – BW – UT – Operator 33

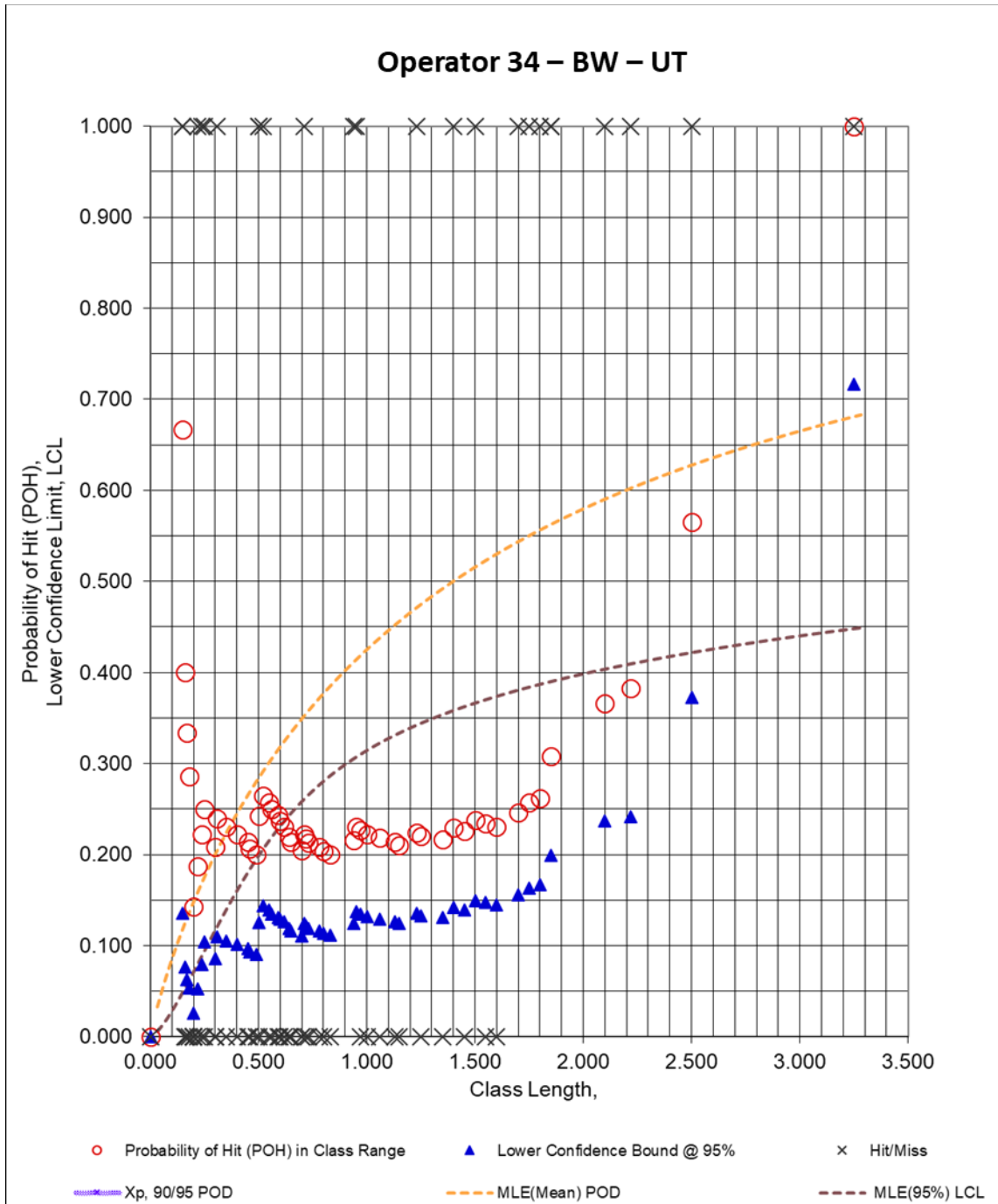


Figure 374. DOEPOD – BW – UT – Operator 34

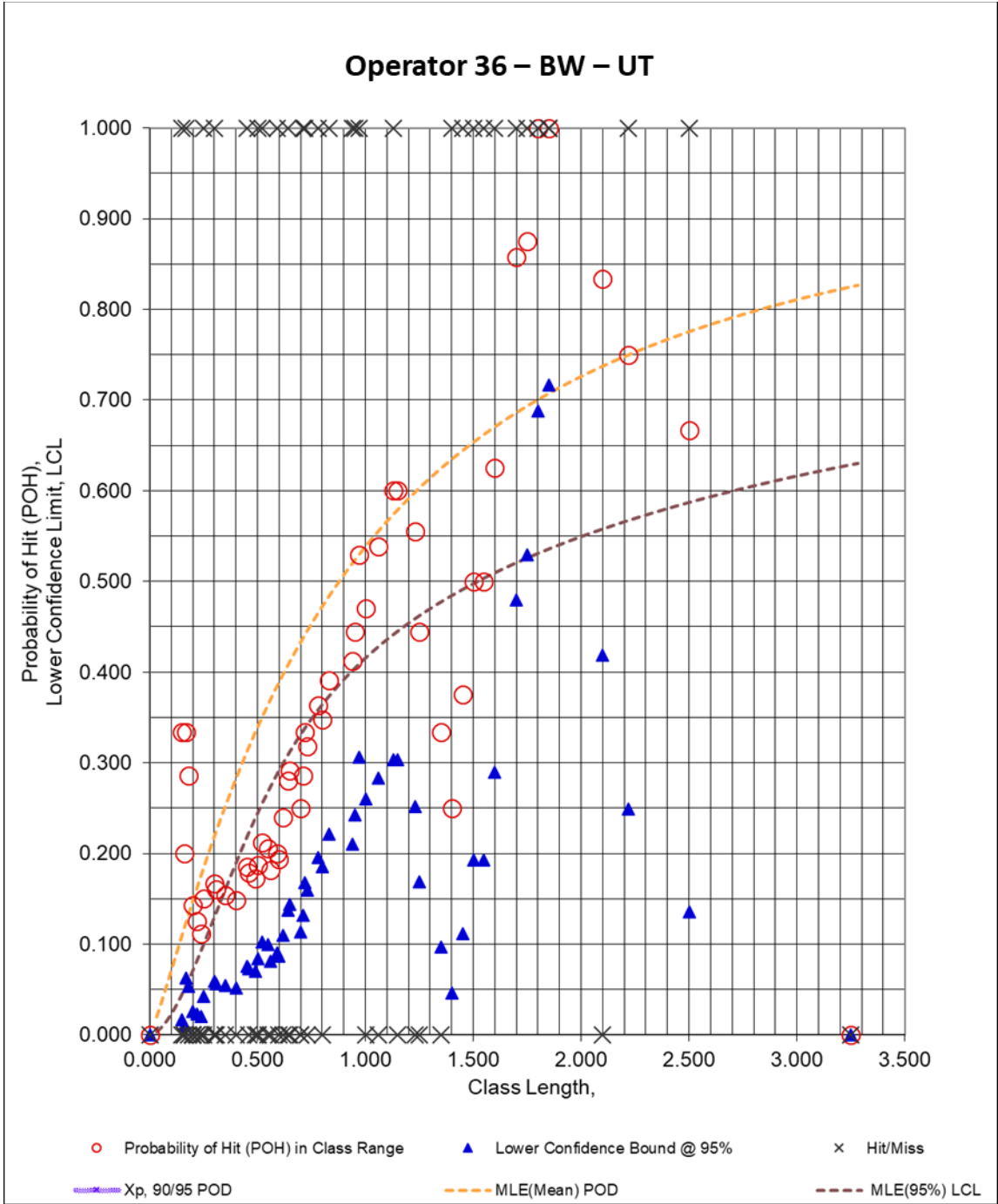


Figure 375. DOEPOD – BW – UT – Operator 36

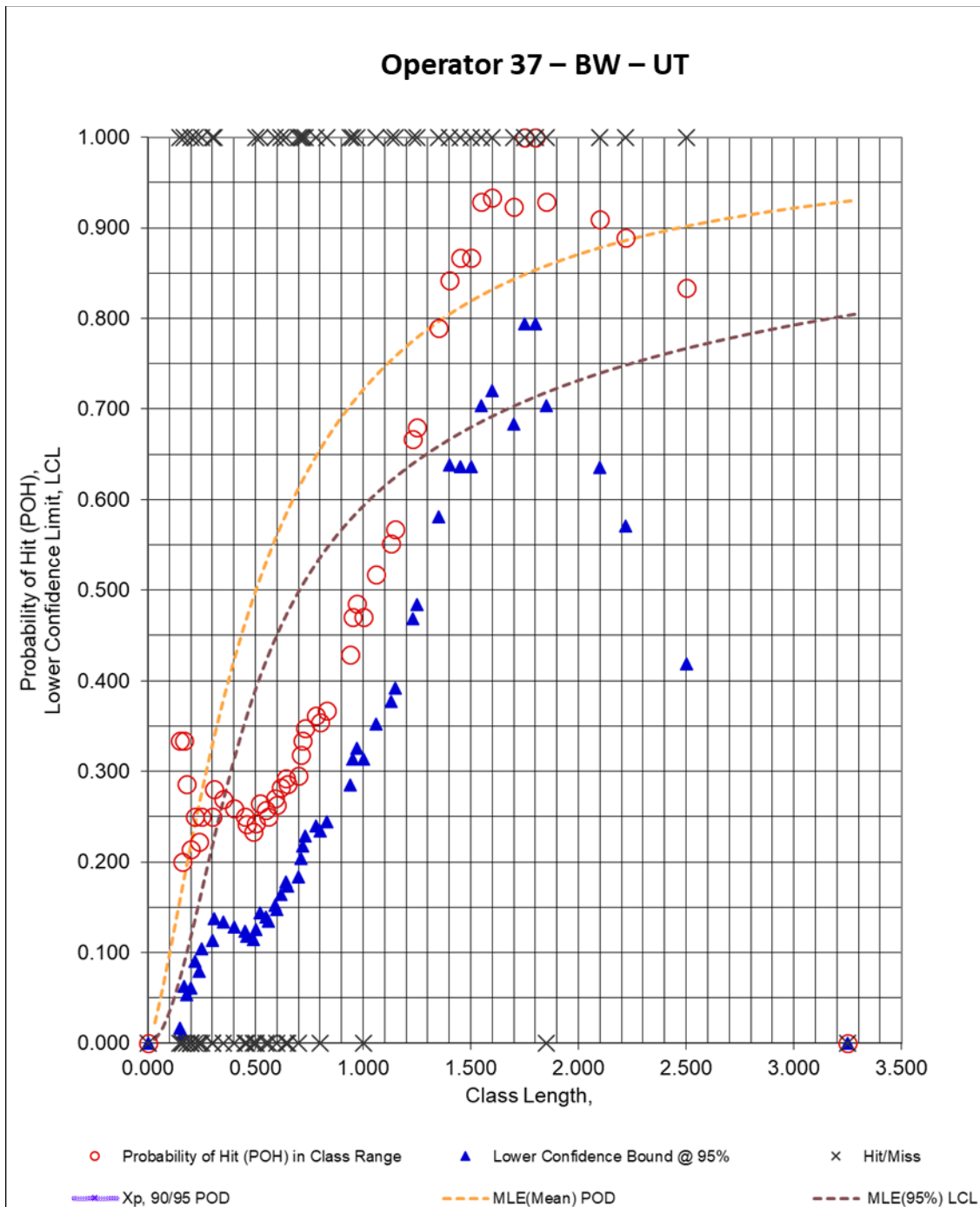


Figure 376. DOEPOD – BW – UT – Operator 37

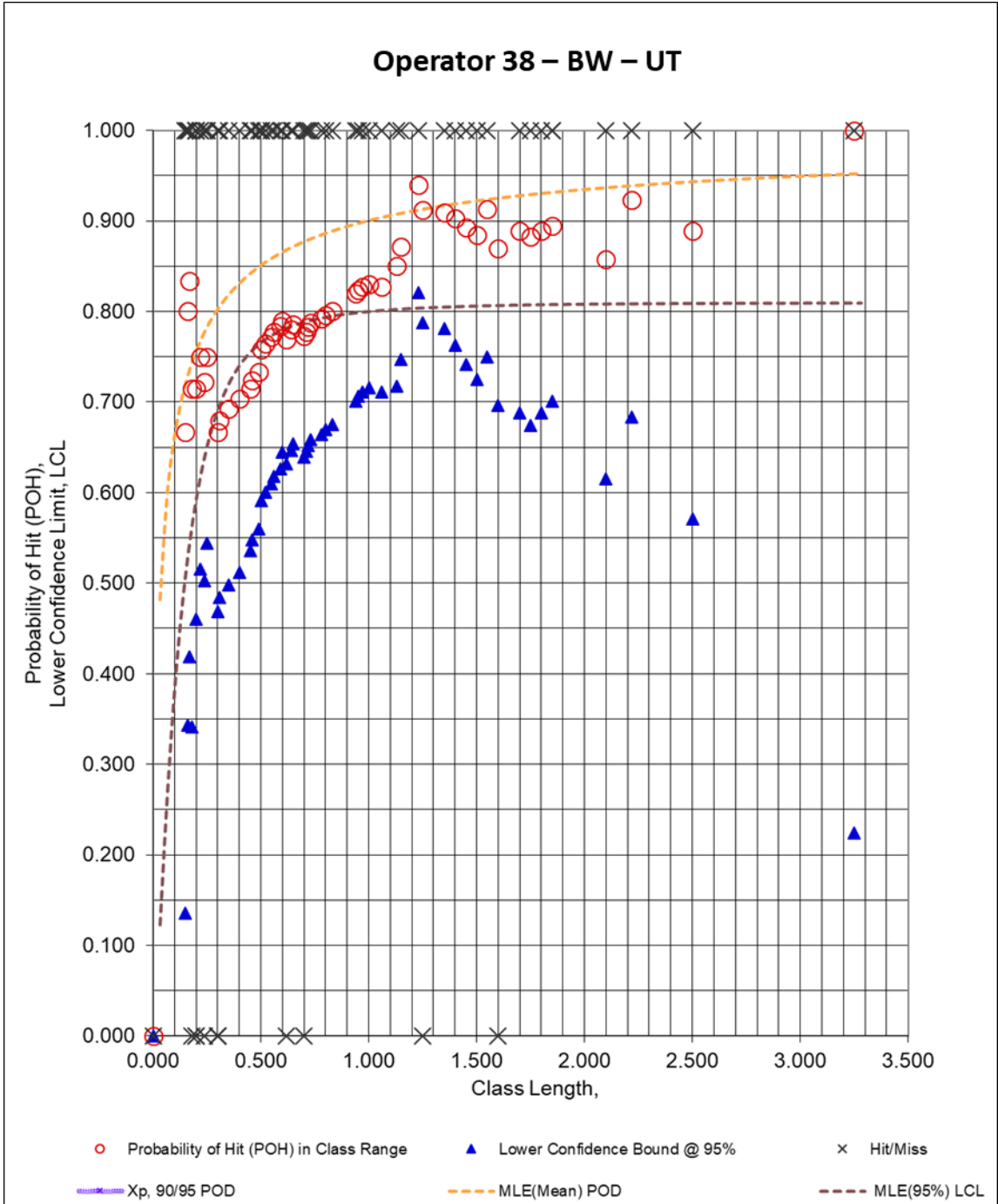


Figure 377. DOEPOD – BW – UT – Operator 38

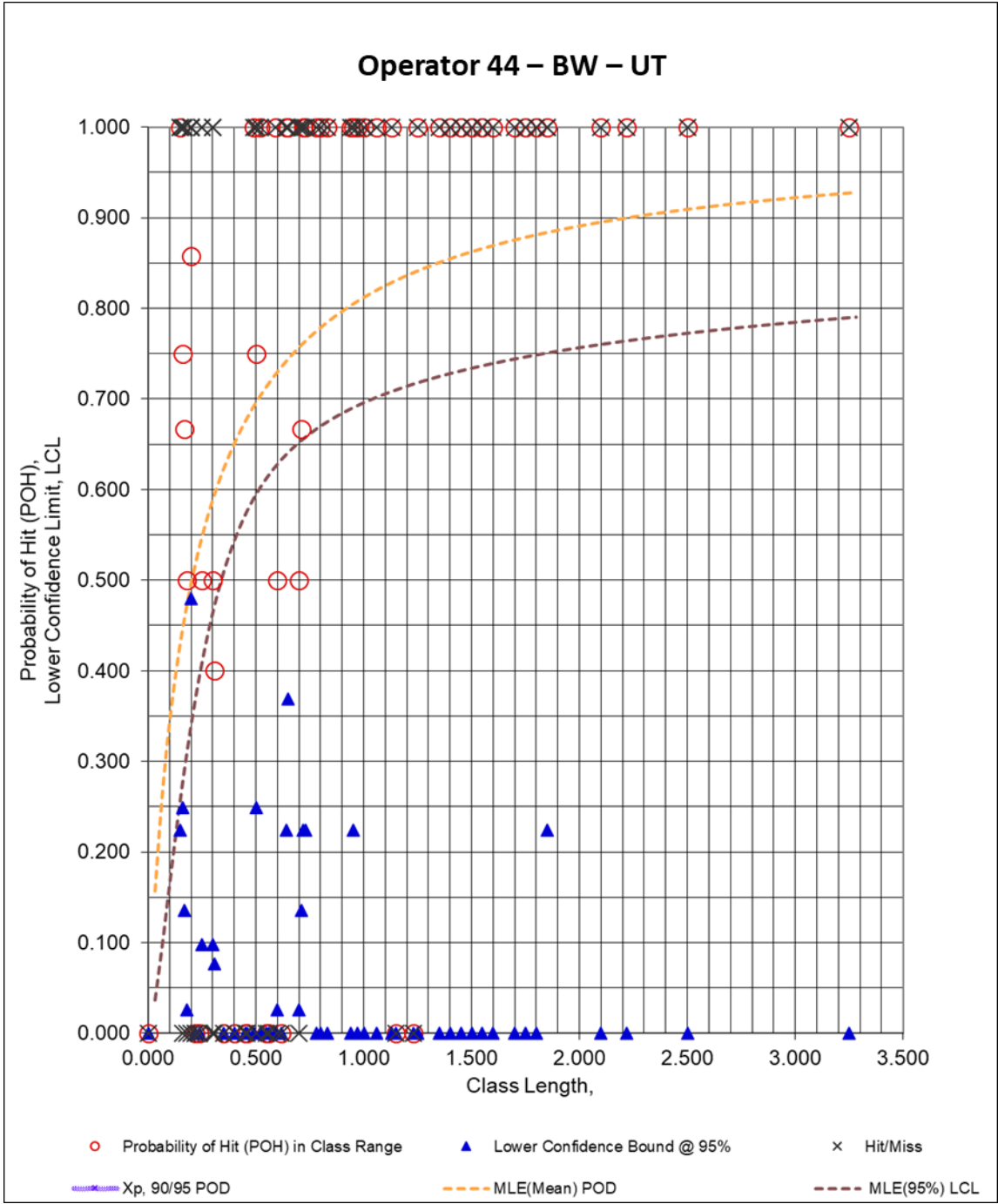


Figure 378. DOEPOD – BW – UT – Operator 44

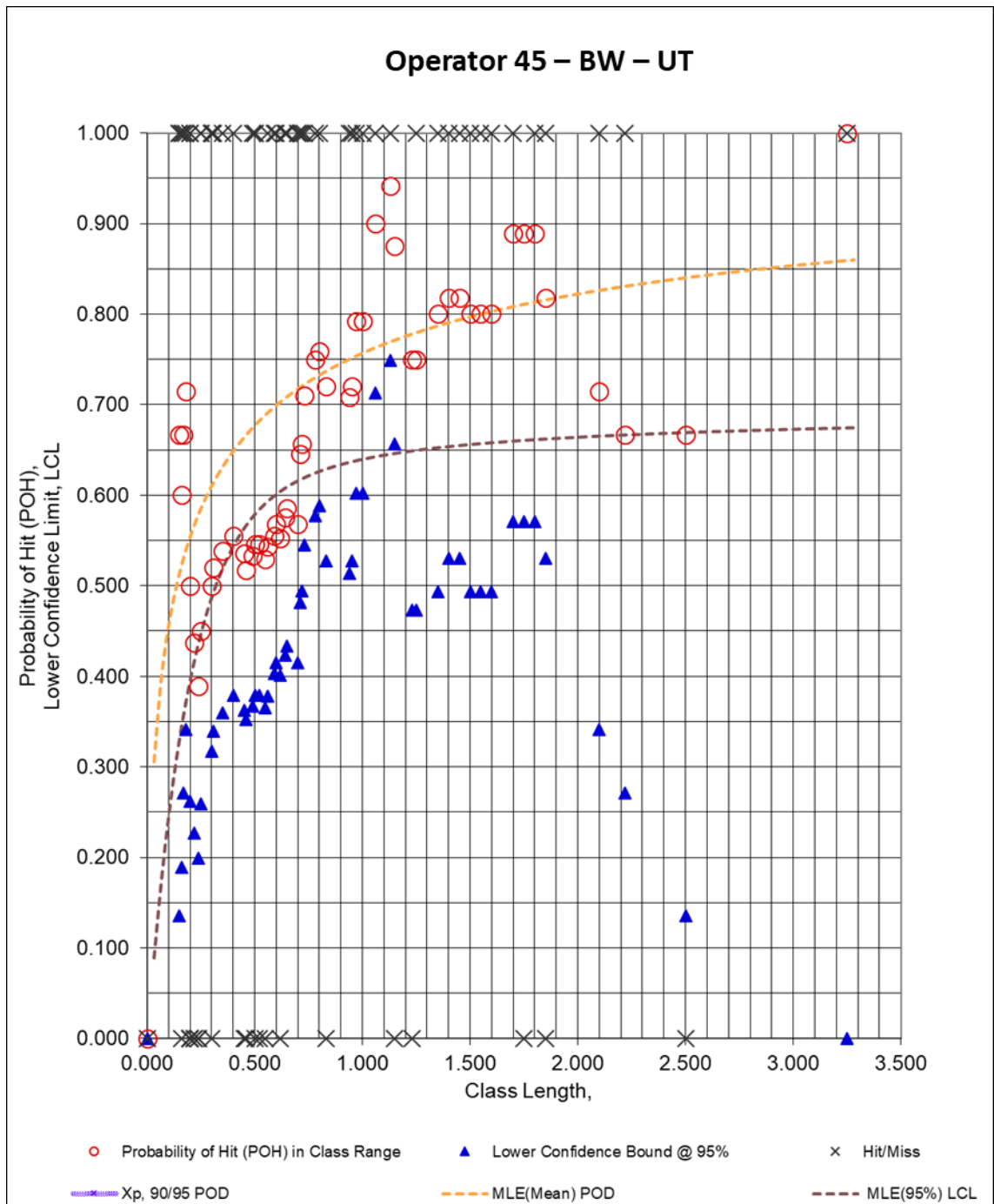


Figure 379. DOEPOD – BW – UT – Operator 45

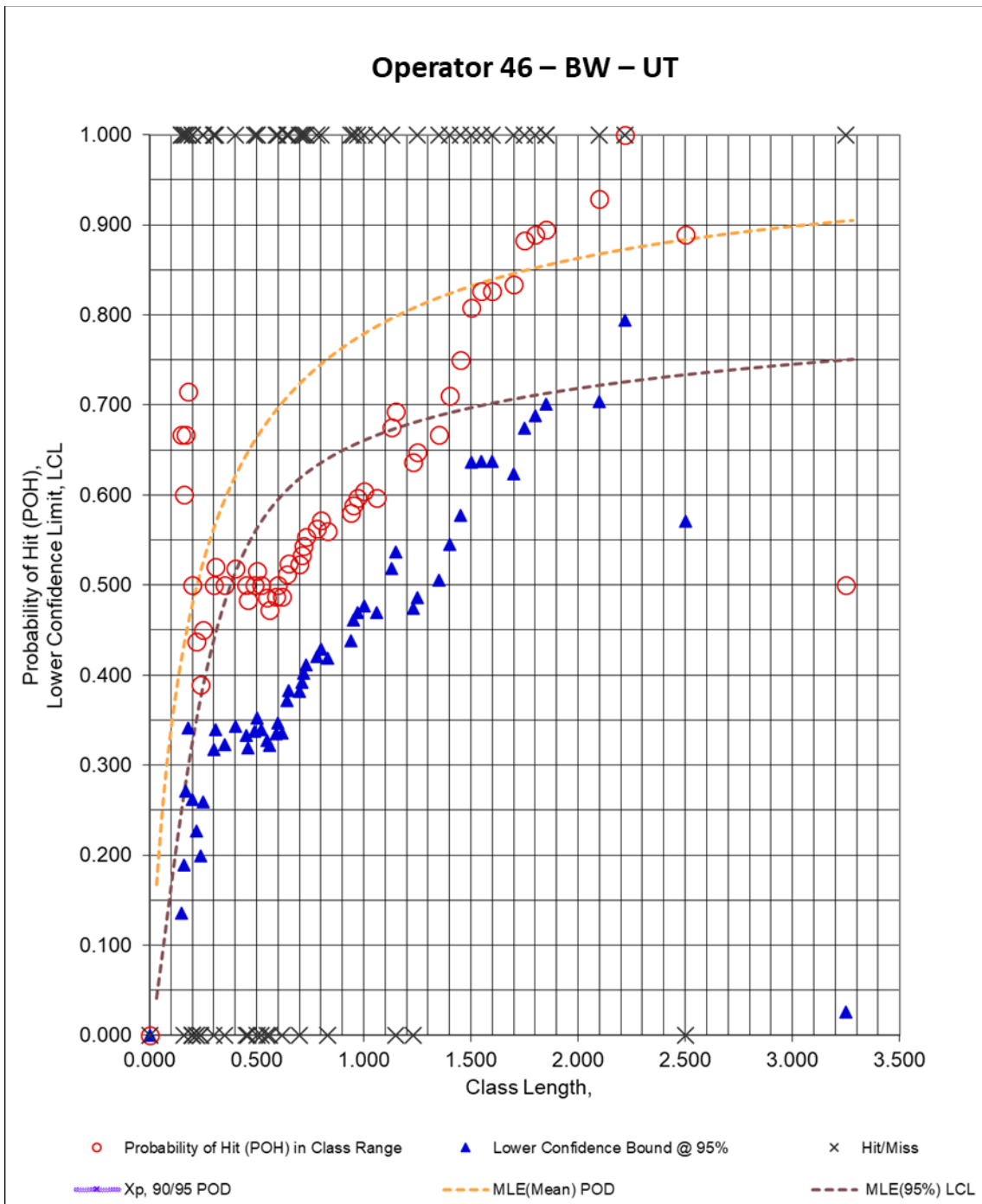


Figure 380. DOEPOD – BW – UT – Operator 46

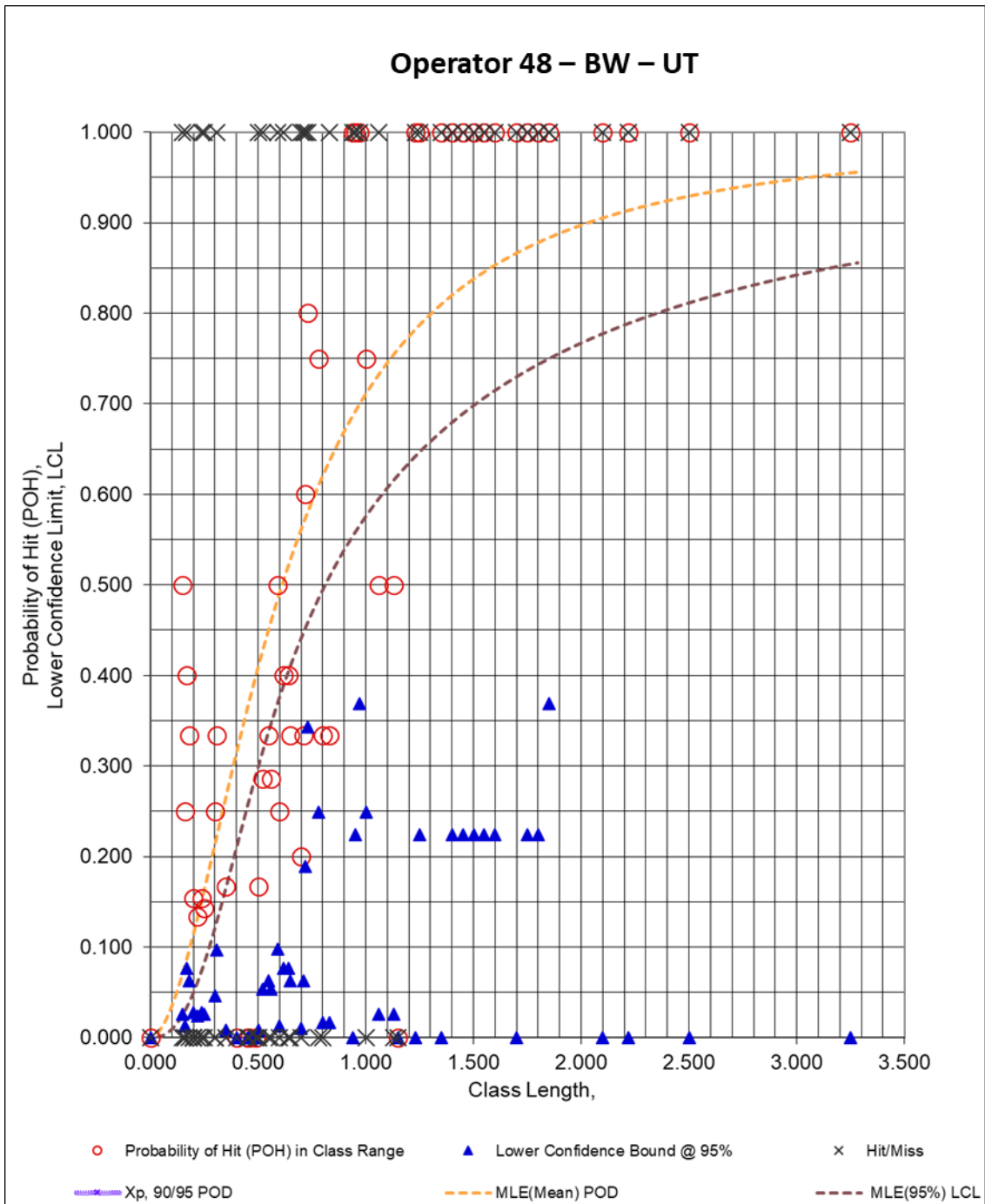


Figure 381. DOEPOD – BW – UT – Operator 48

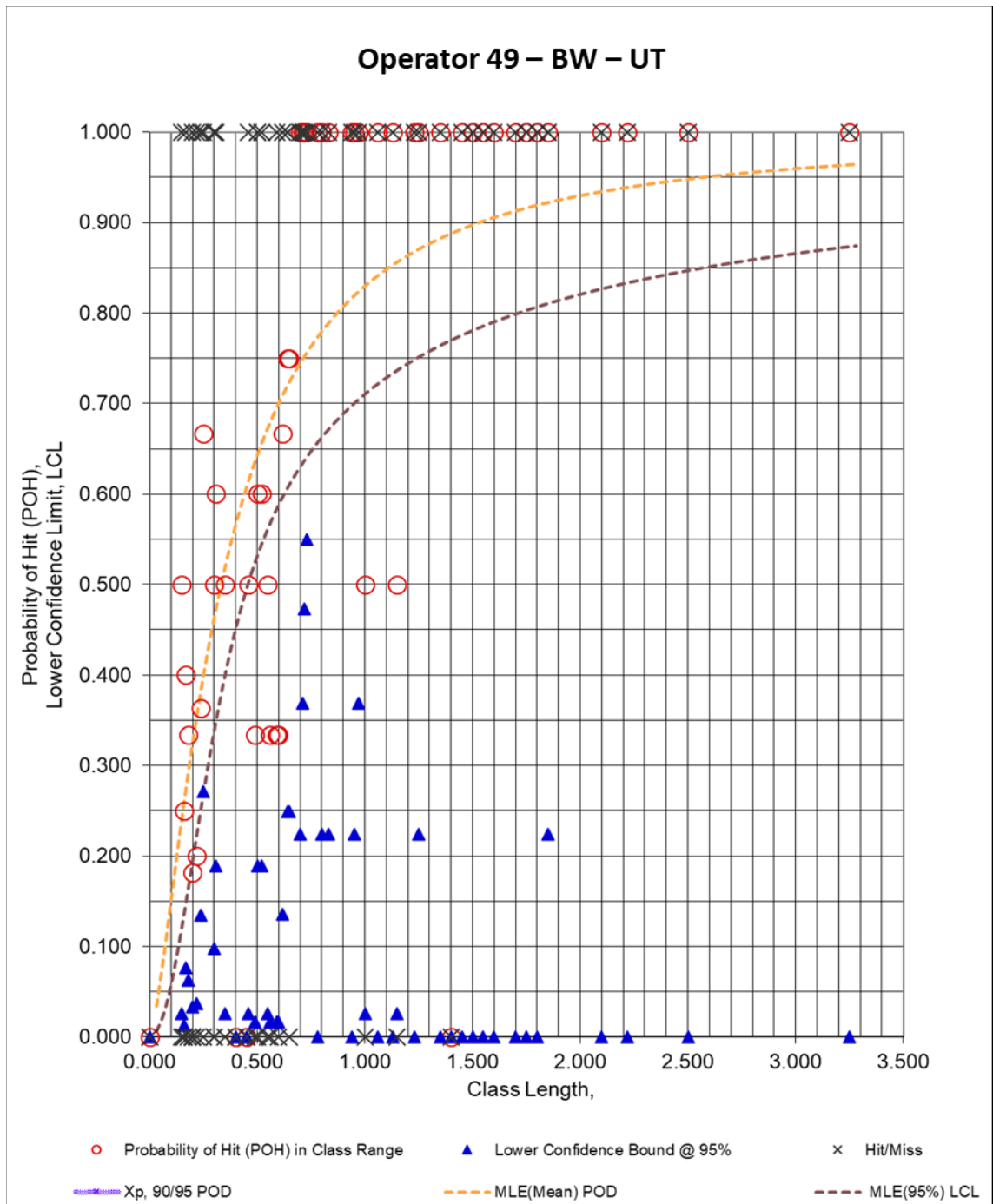


Figure 382. DOEPOD – BW – UT – Operator 49

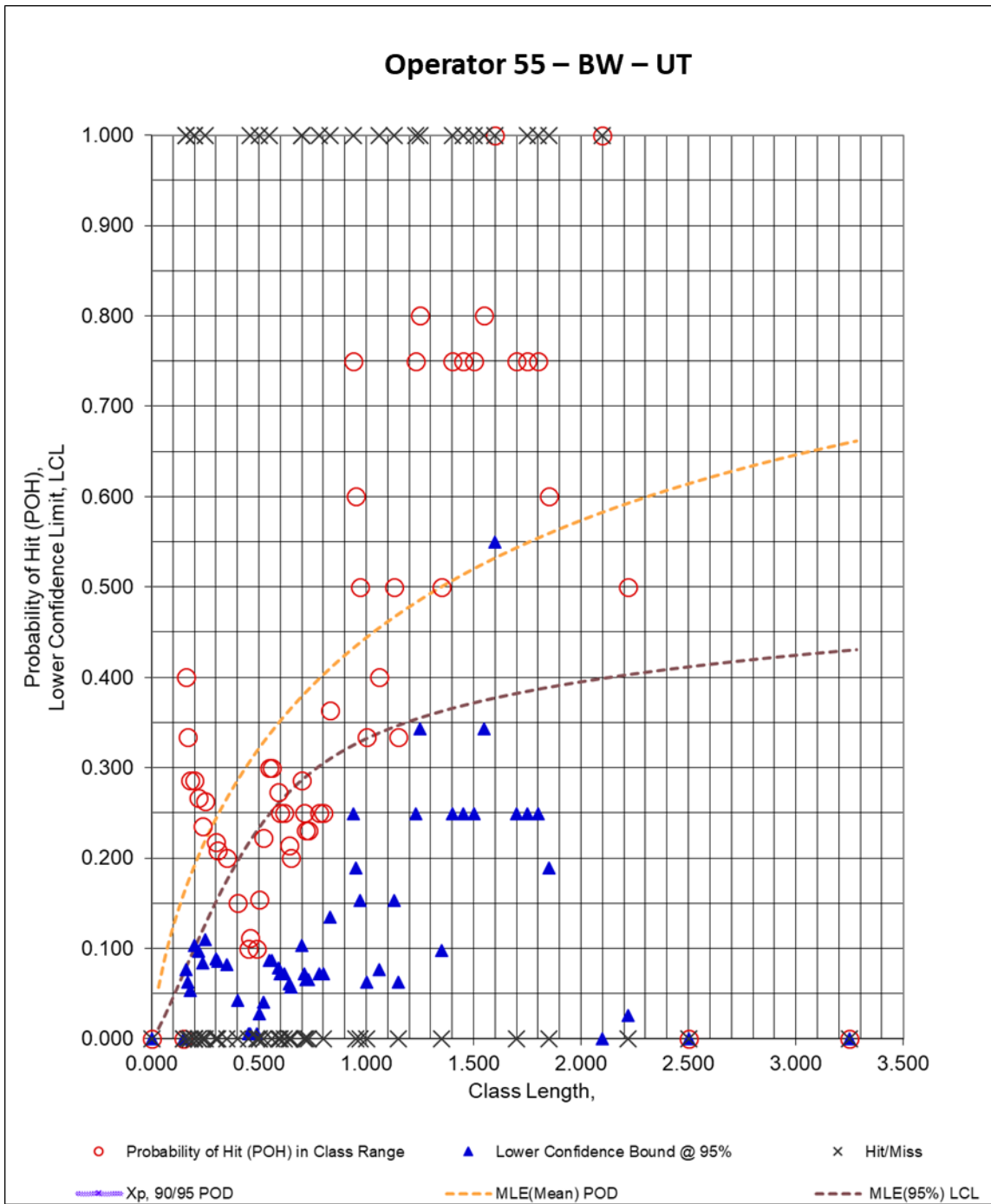


Figure 383. DOEPOD – BW – UT – Operator 55

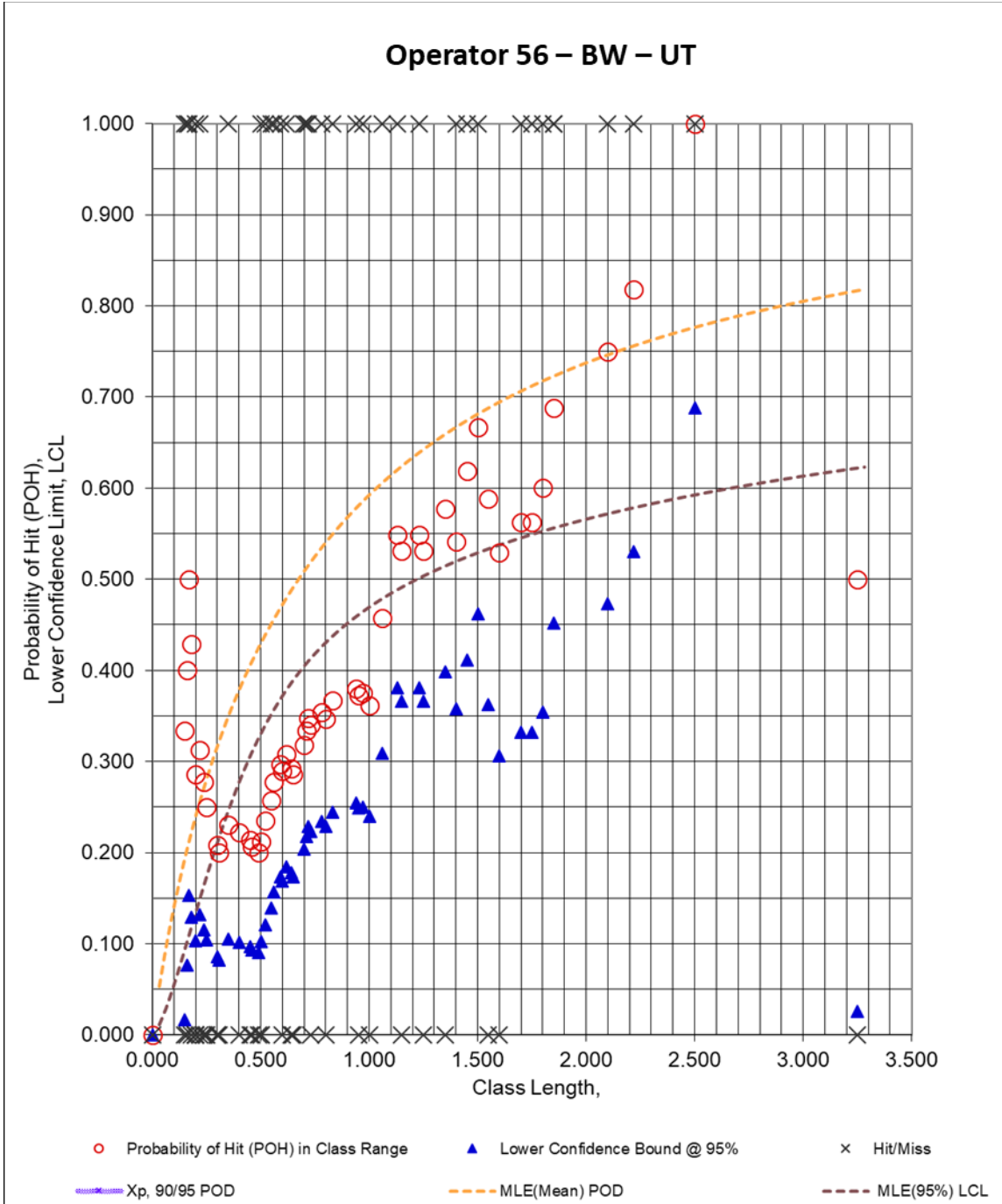


Figure 384. DOEPOD – BW – UT – Operator 56

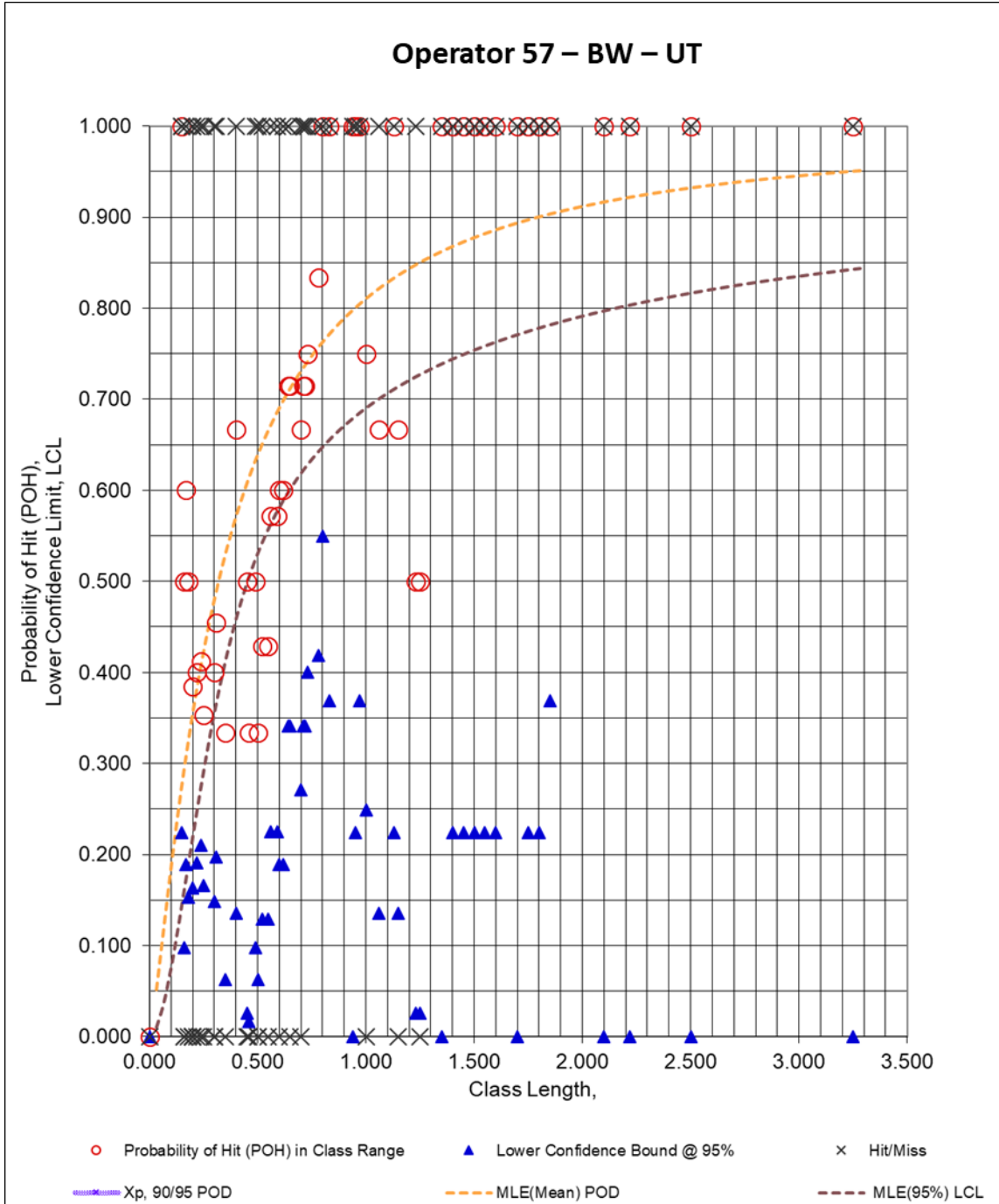


Figure 385. DOEPOD – BW – UT – Operator 57

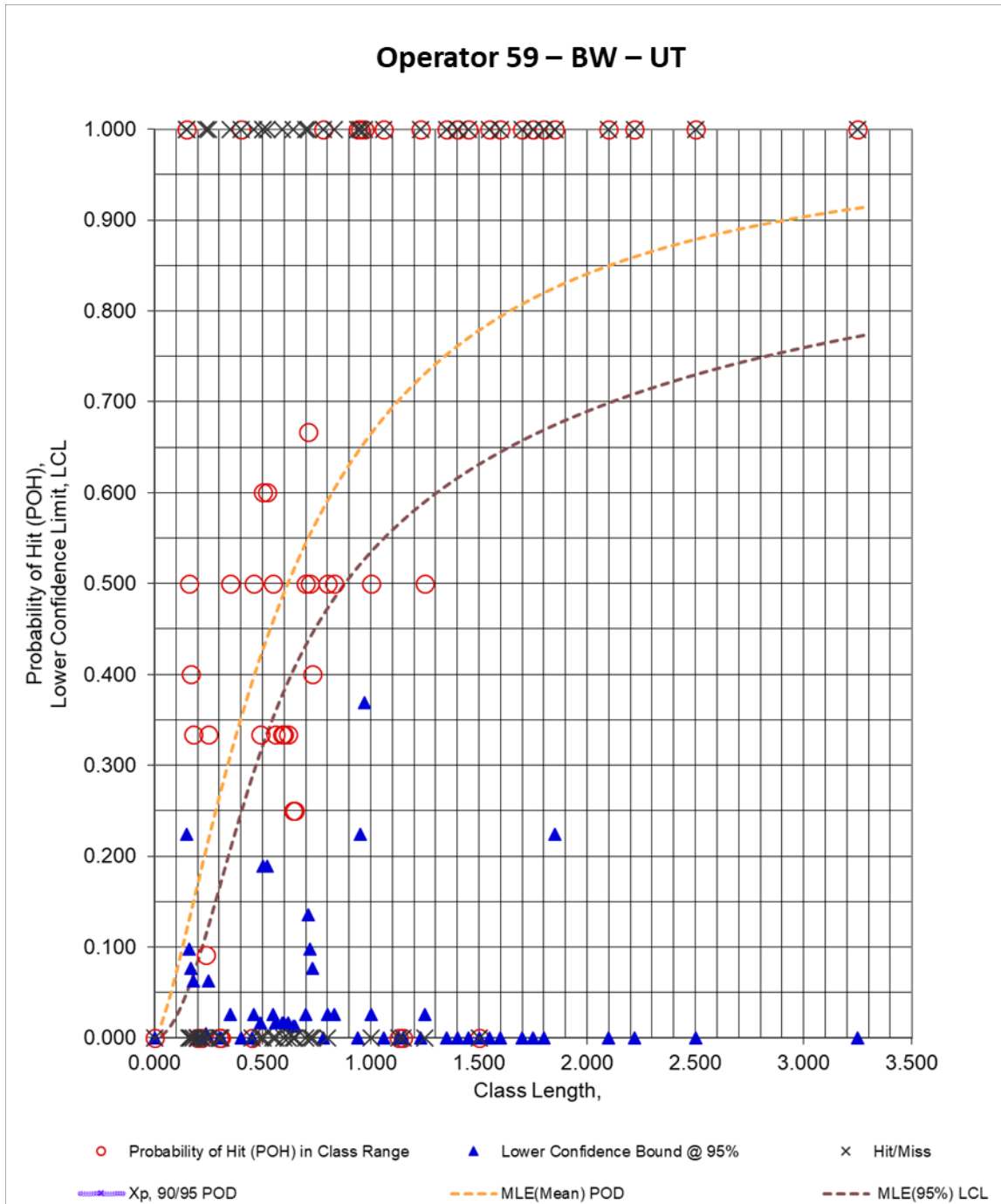


Figure 386. DOEPOD – BW – UT – Operator 59

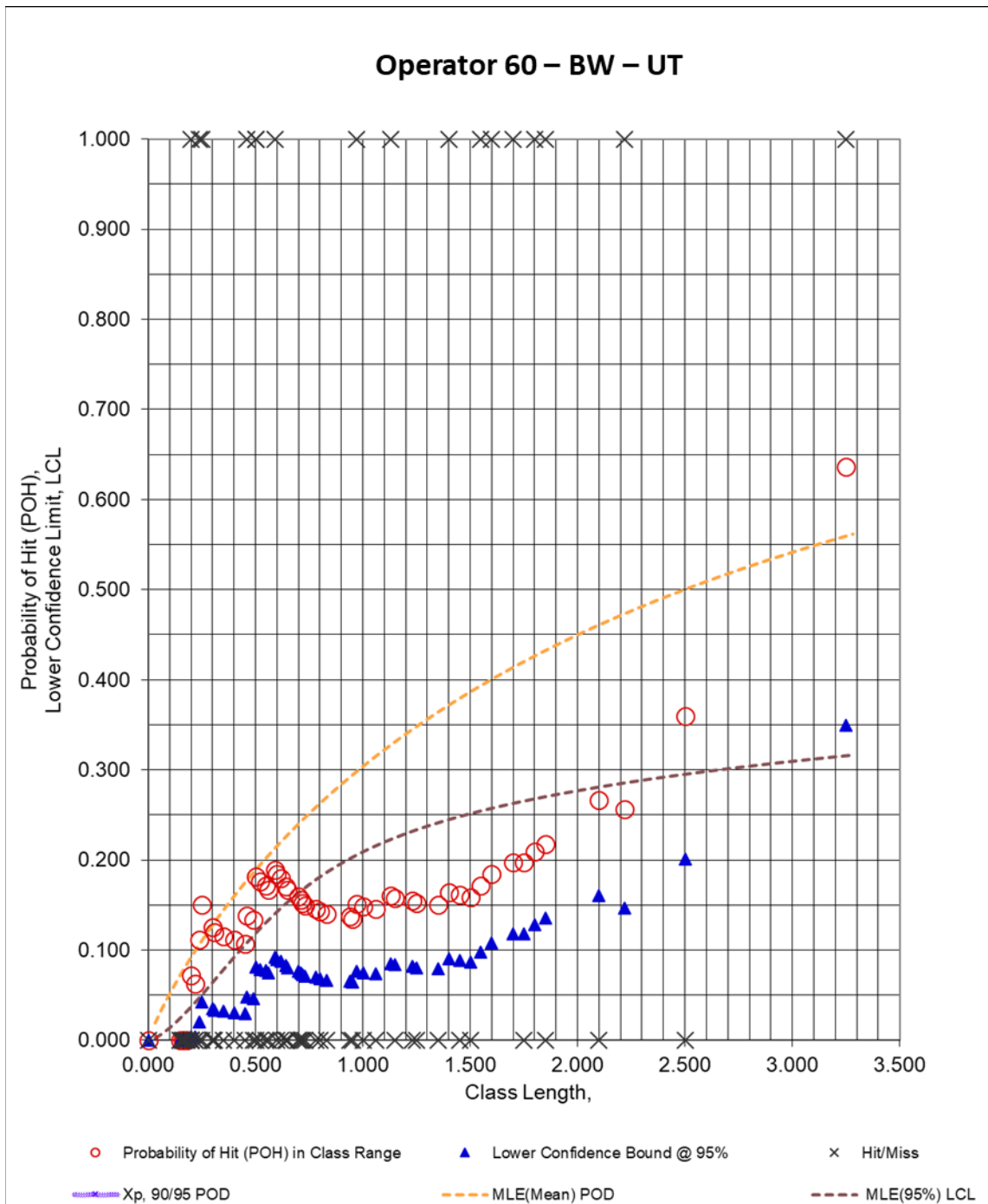


Figure 387. DOEPOD – BW – UT – Operator 60

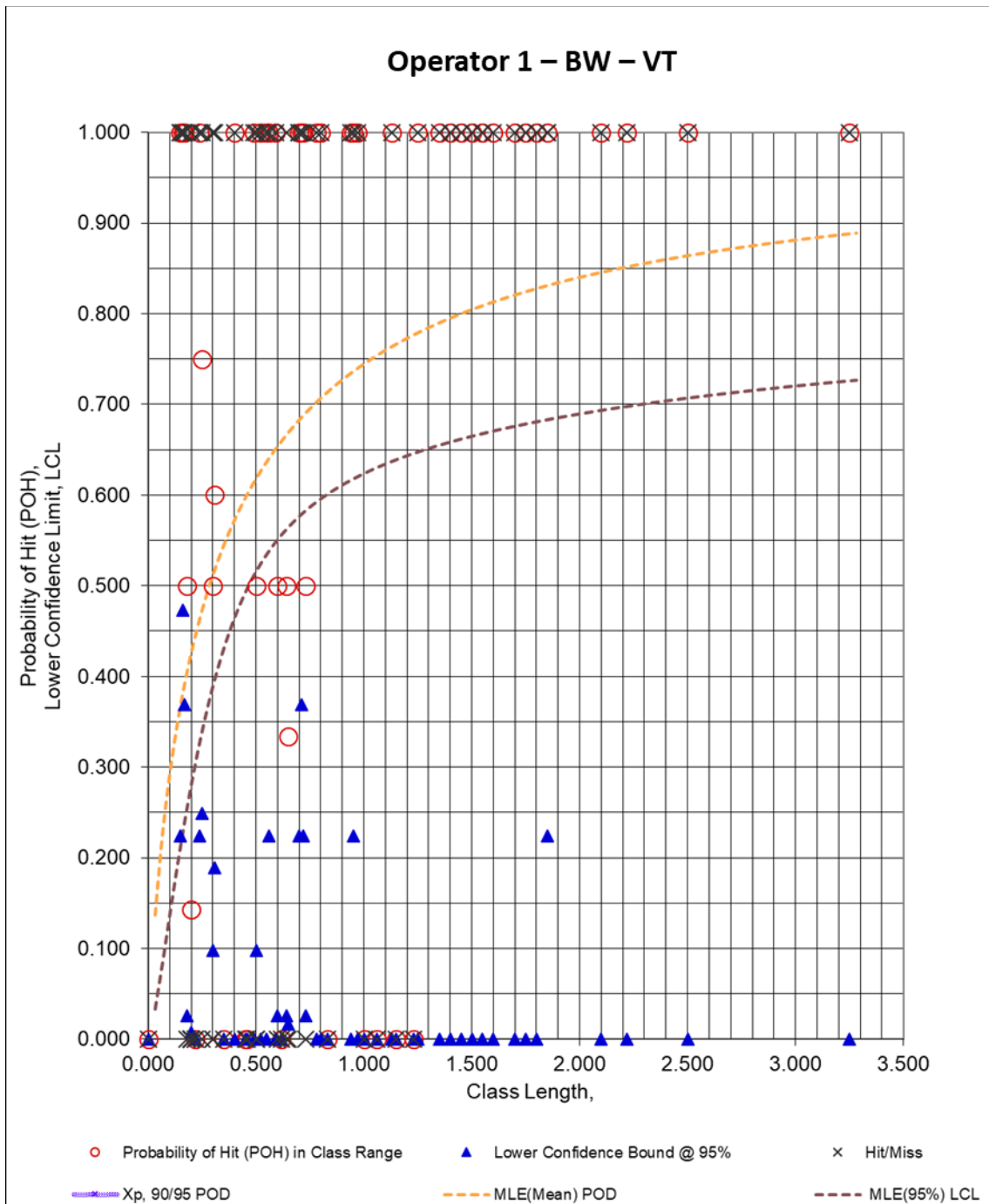


Figure 388. DOEPOD – BW – VT – Operator 1

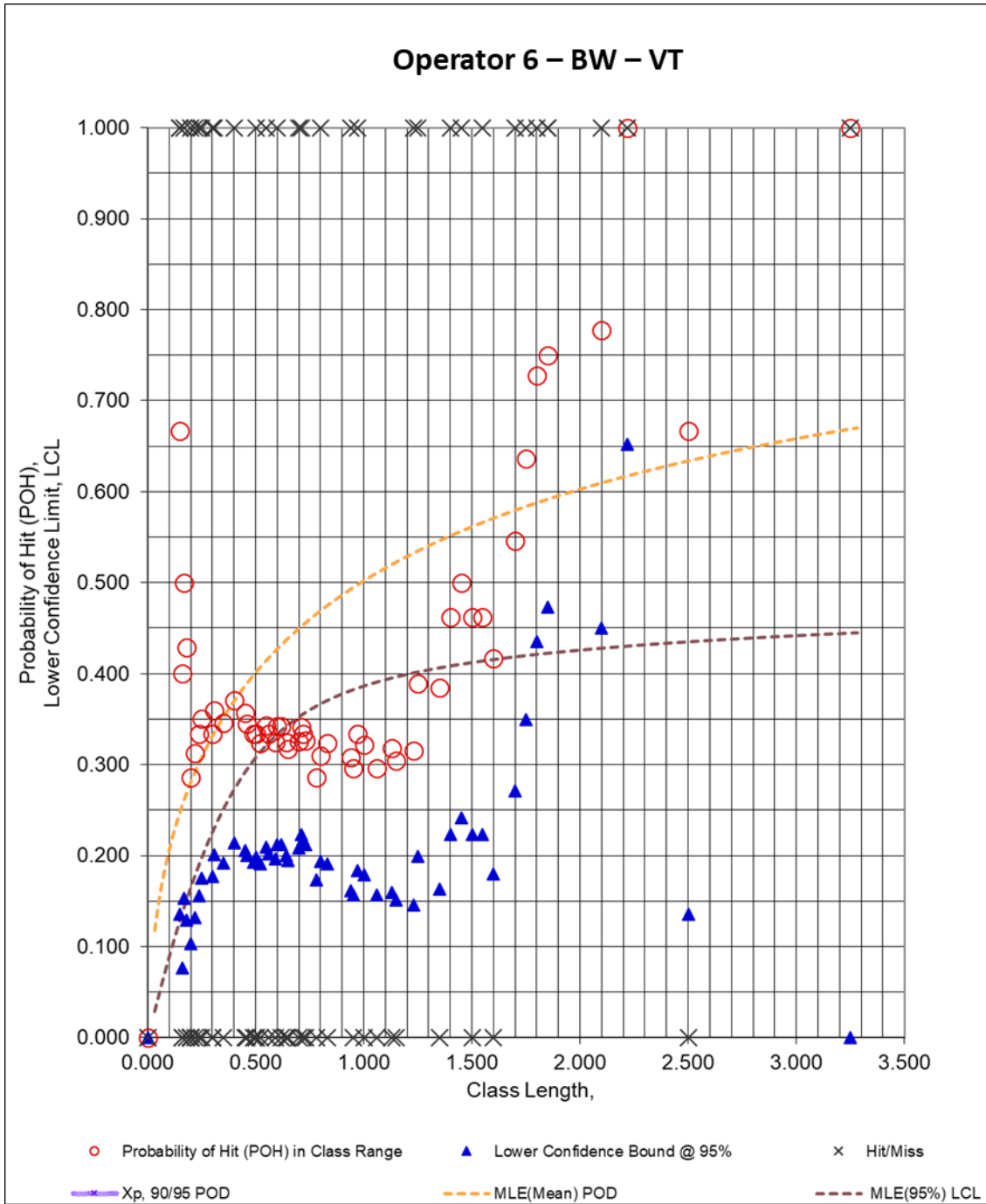


Figure 389. DOEPOD – BW – VT – Operator 6

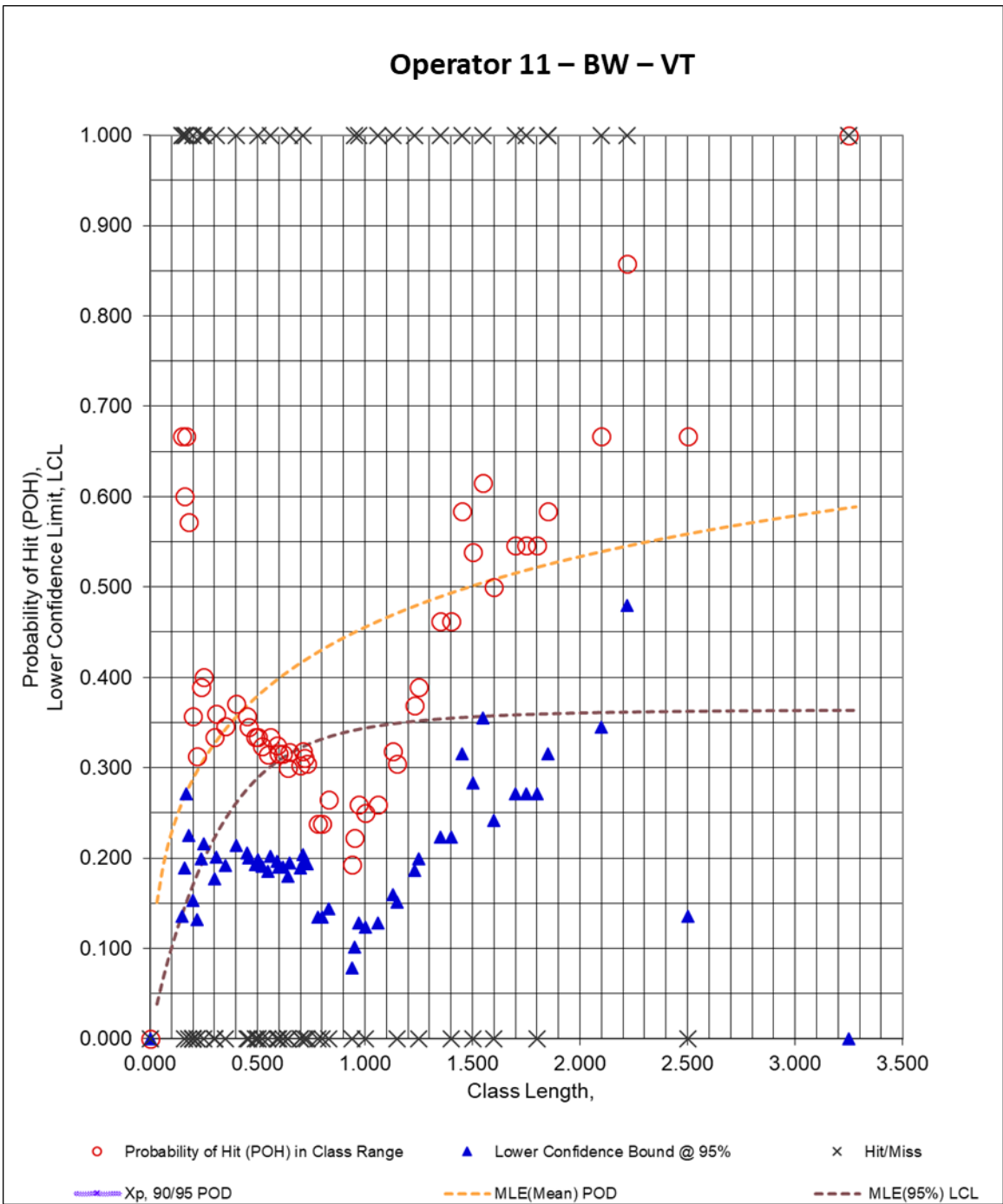


Figure 390. DOEPOD – BW – VT – Operator 11

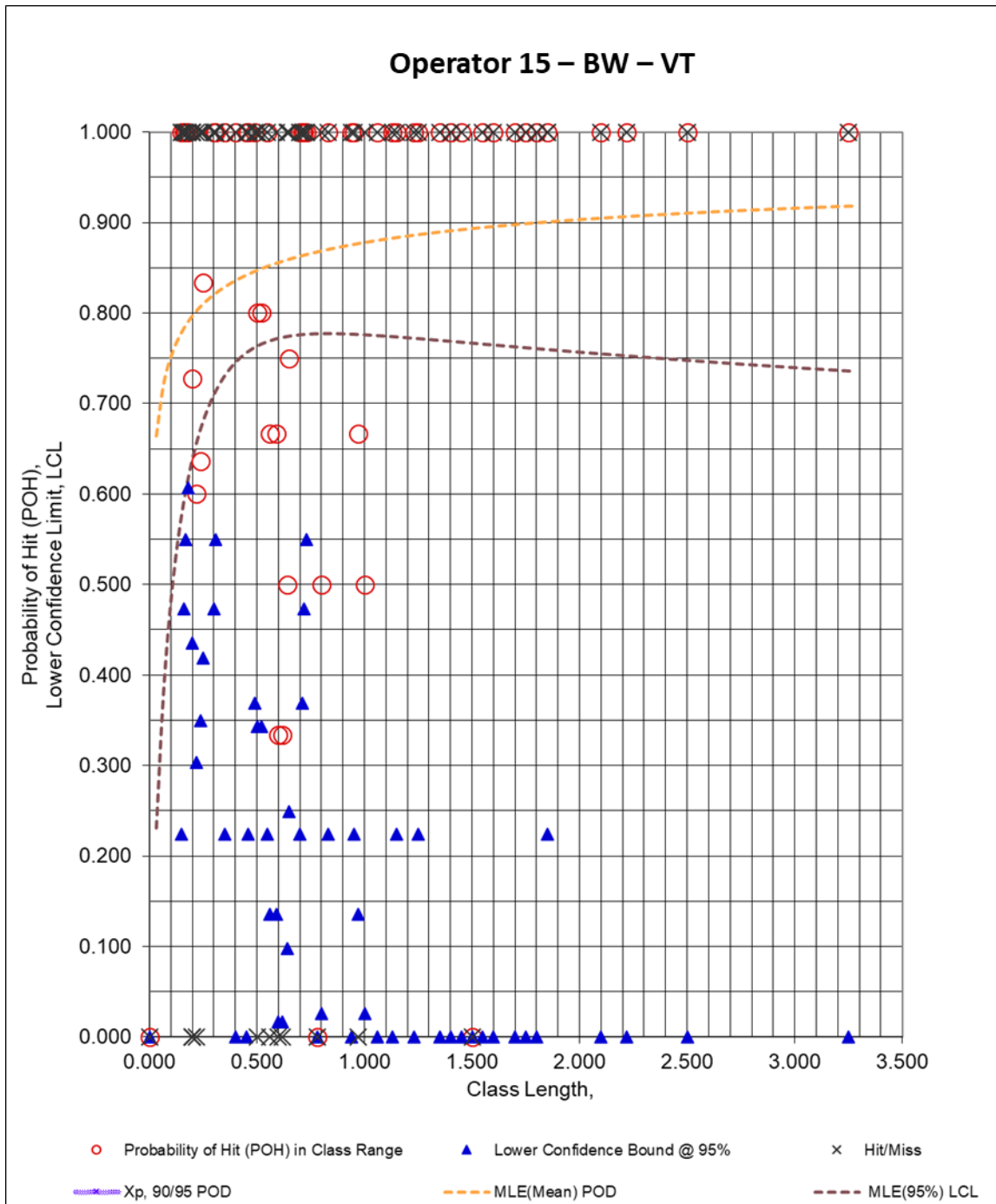


Figure 391. DOEPOD – BW – VT – Operator 15

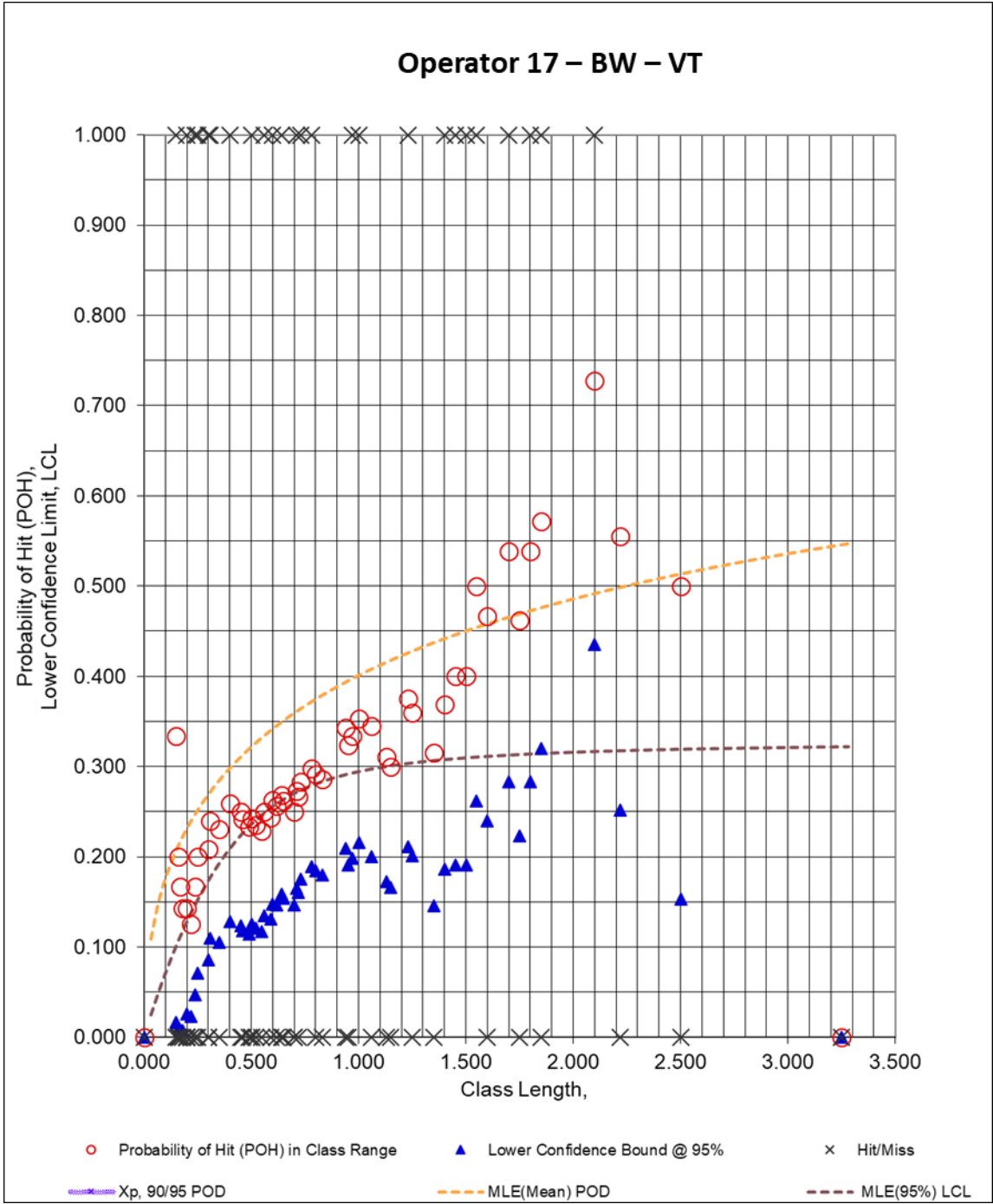


Figure 392. DOEPOD – BW – VT – Operator 17

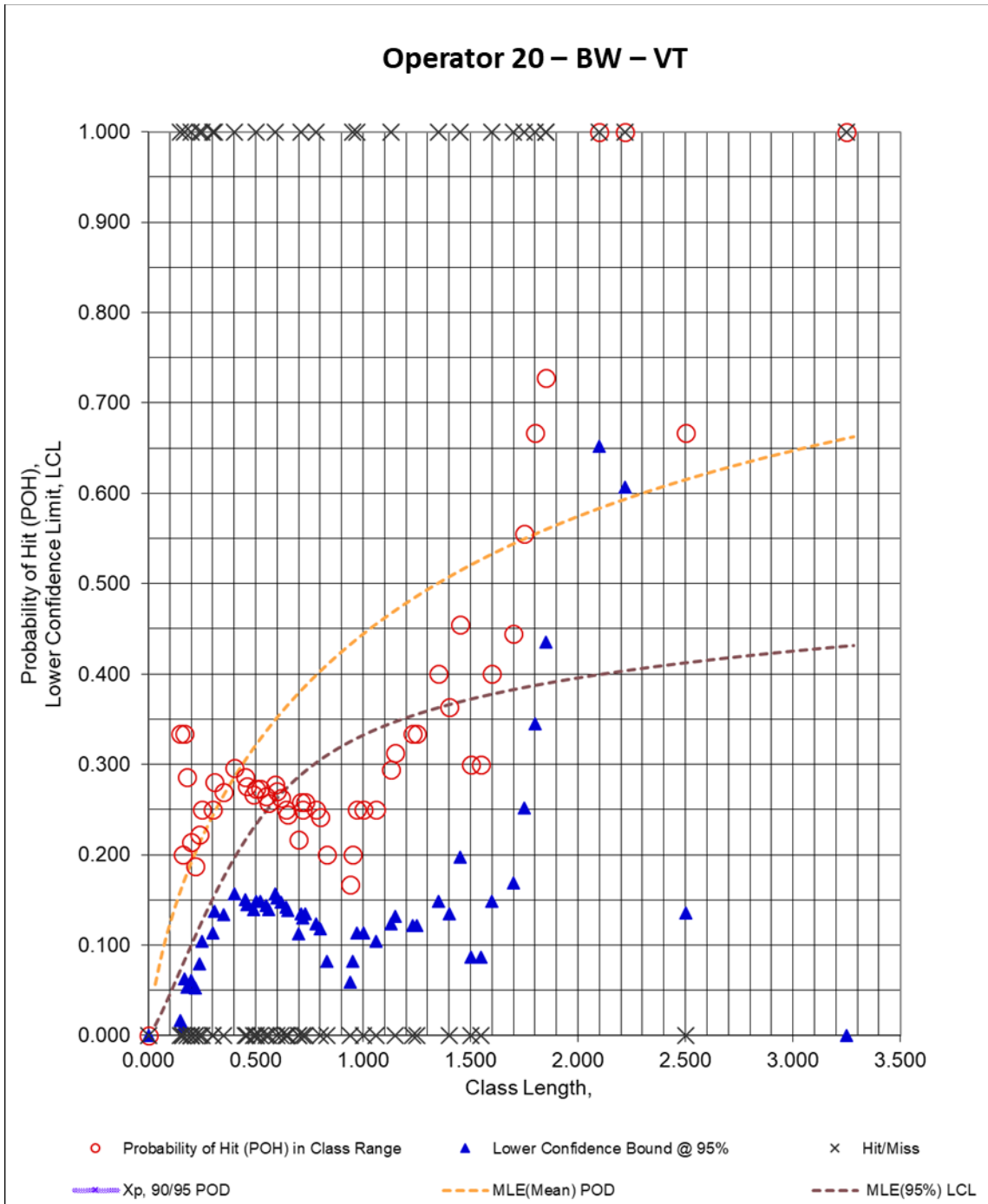


Figure 393. DOEPOD – BW – VT – Operator 20

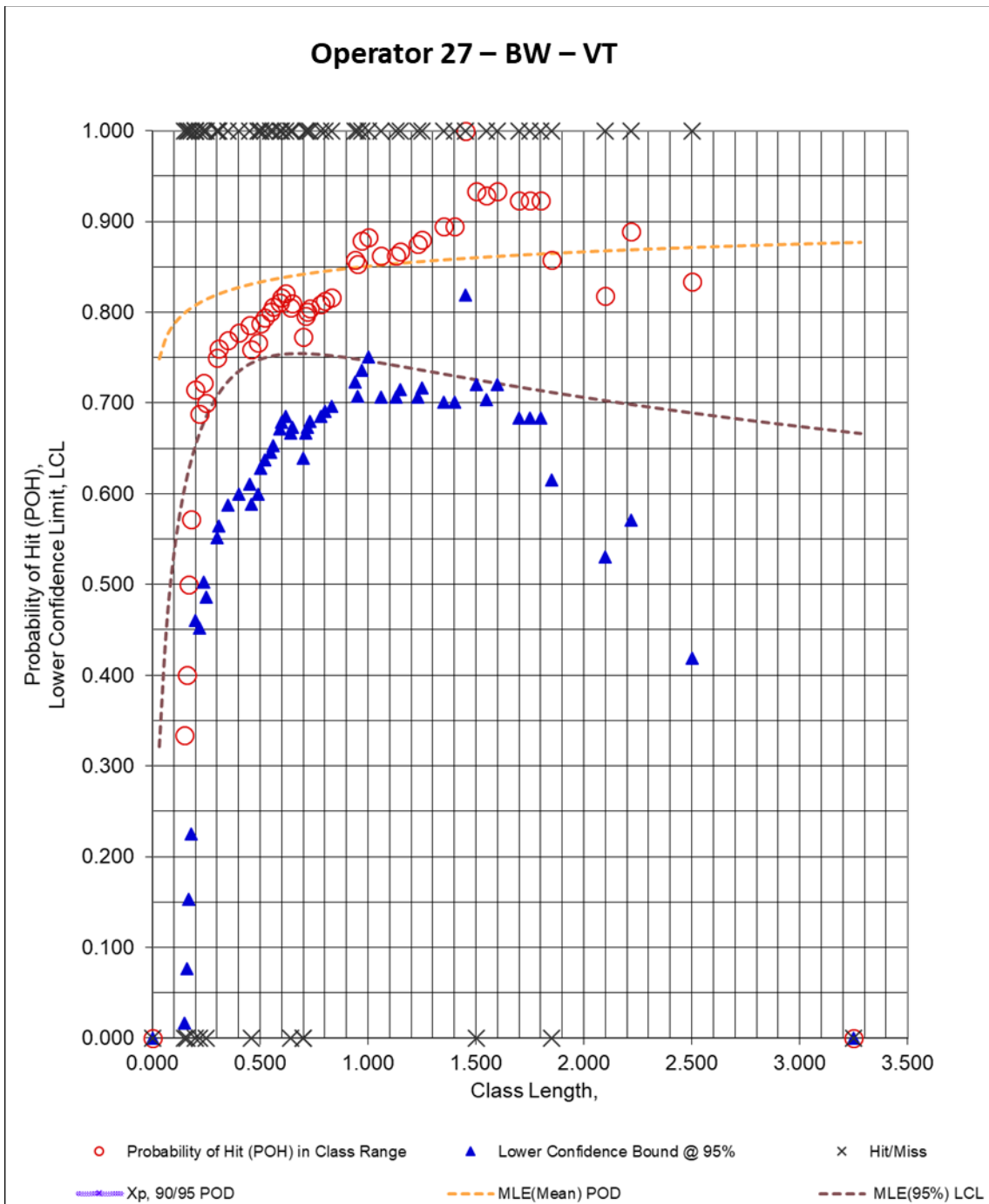


Figure 394. DOEPOD – BW – VT – Operator 27

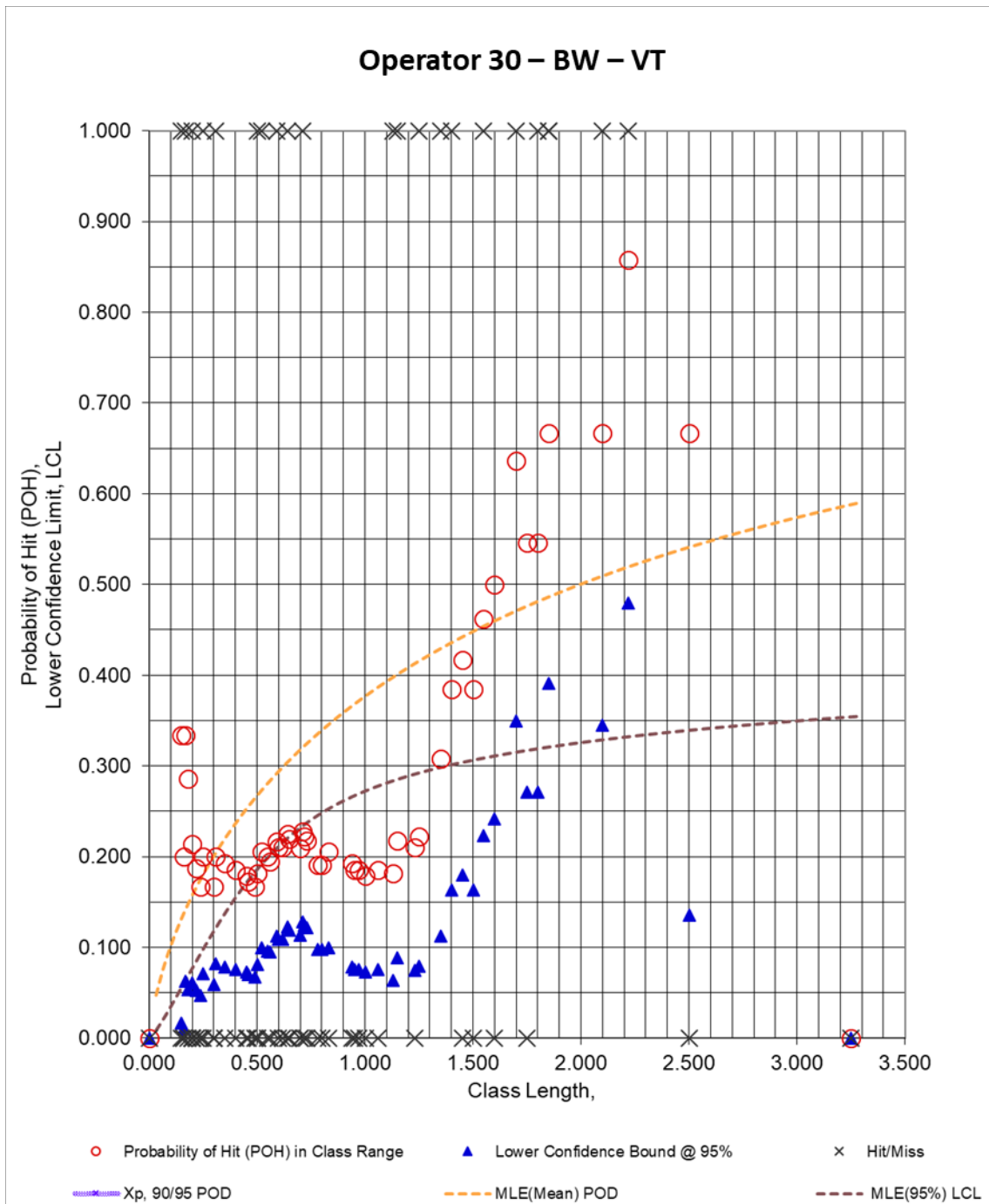


Figure 395. DOEPOD – BW – VT – Operator 30

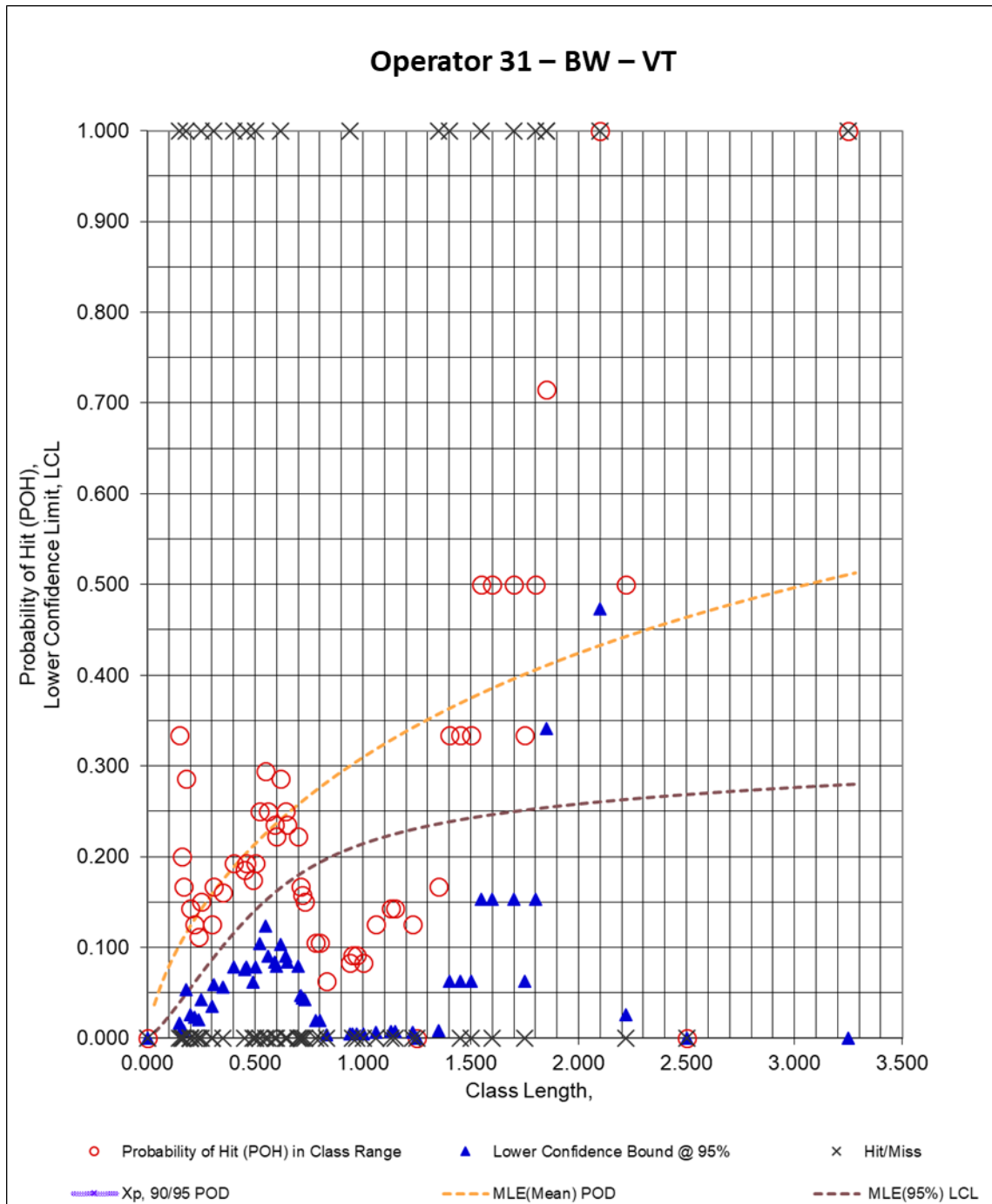


Figure 396. DOEPOD – BW – VT – Operator 31

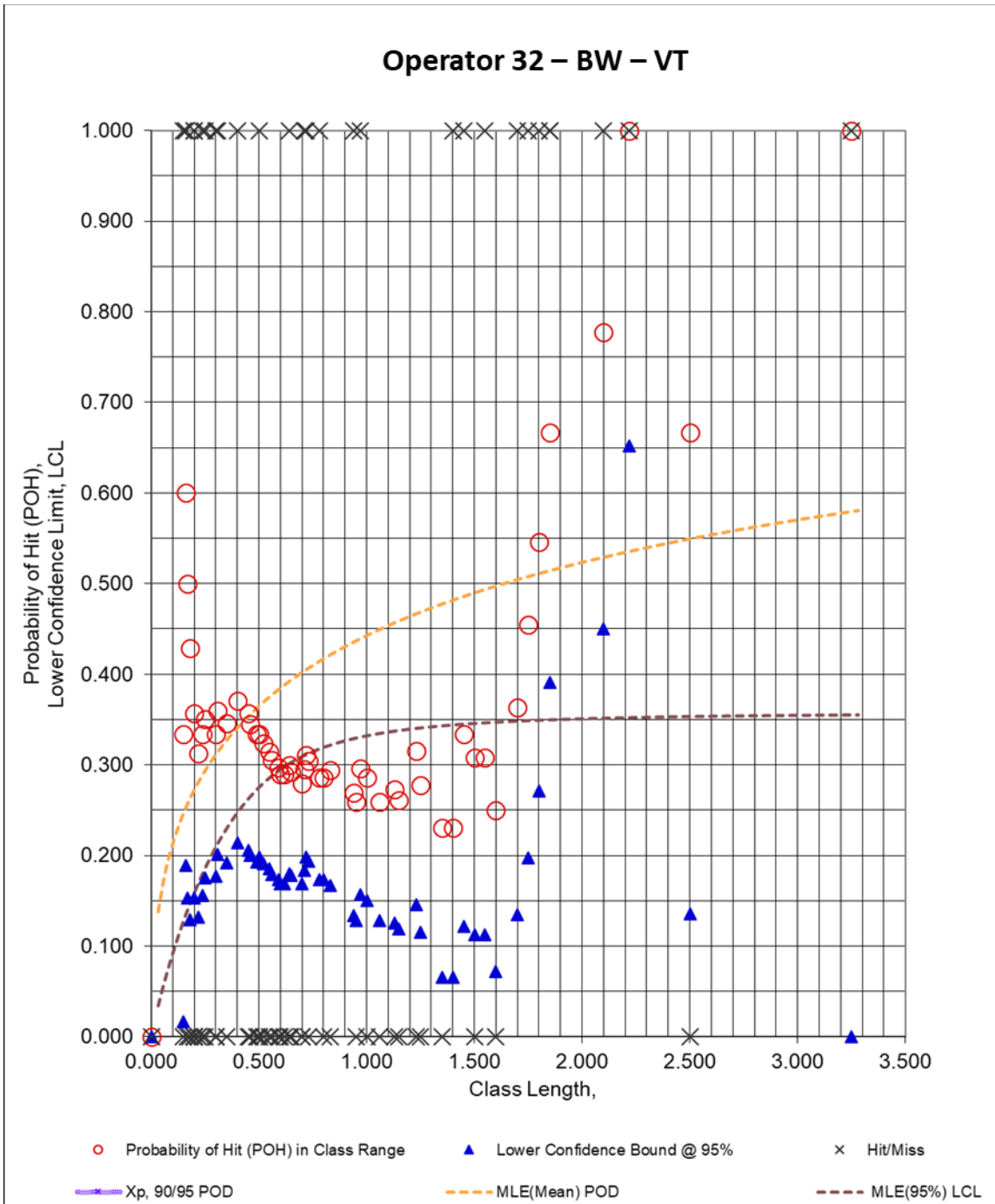


Figure 397. DOEPOD – BW – VT – Operator 32

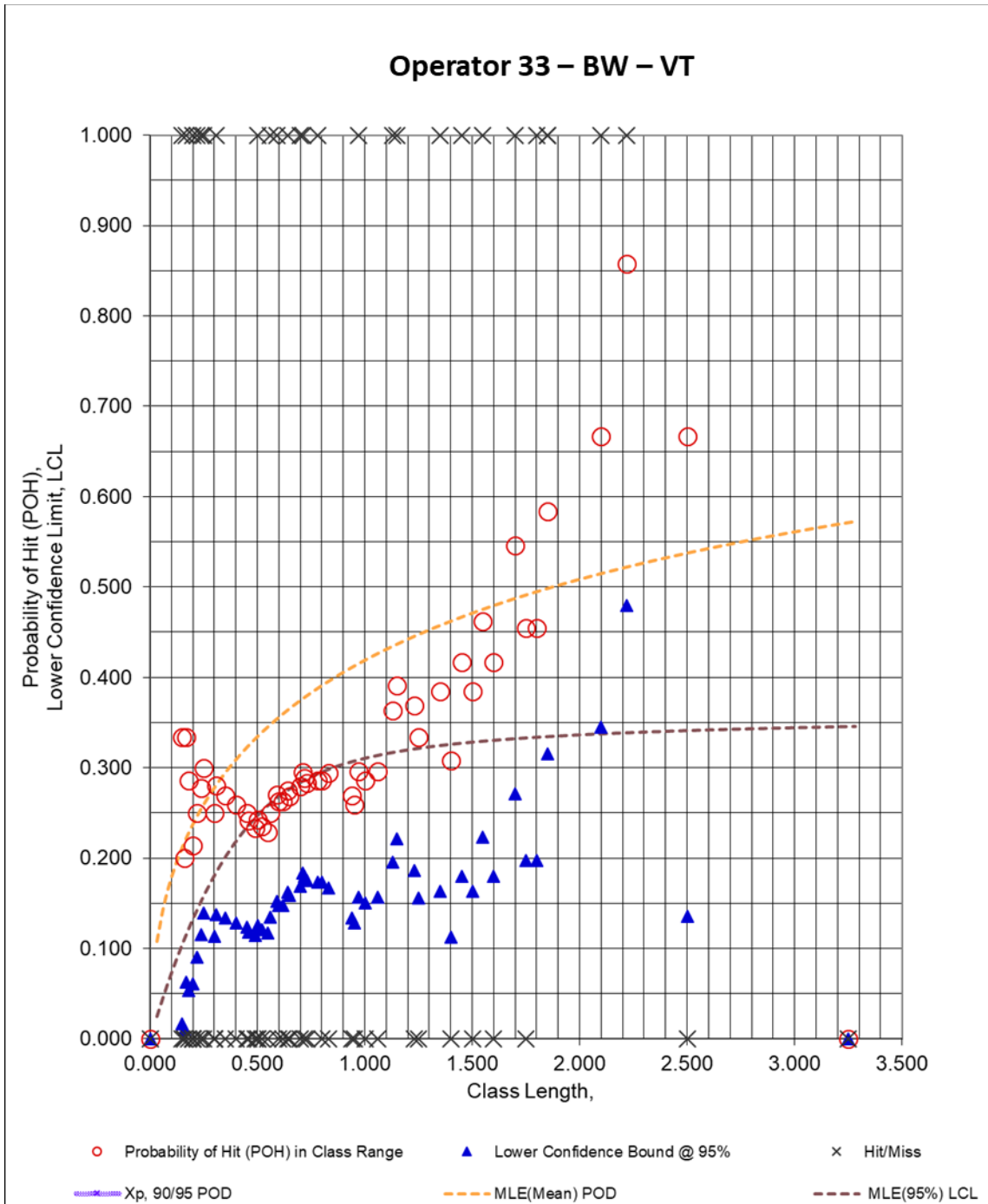


Figure 398. DOEPOD – BW – VT – Operator 33

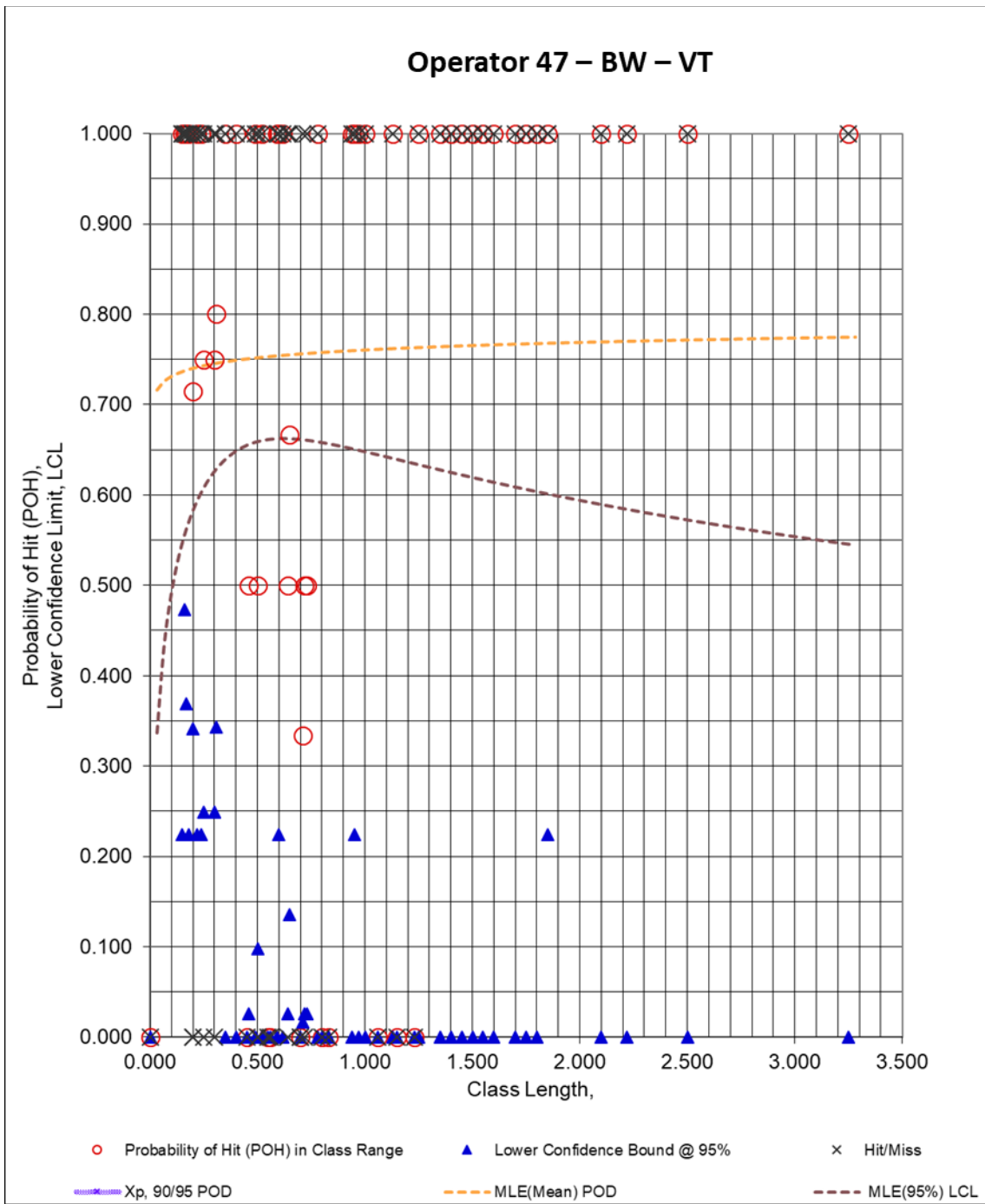


Figure 399. DOEPOD – BW – VT – Operator 47

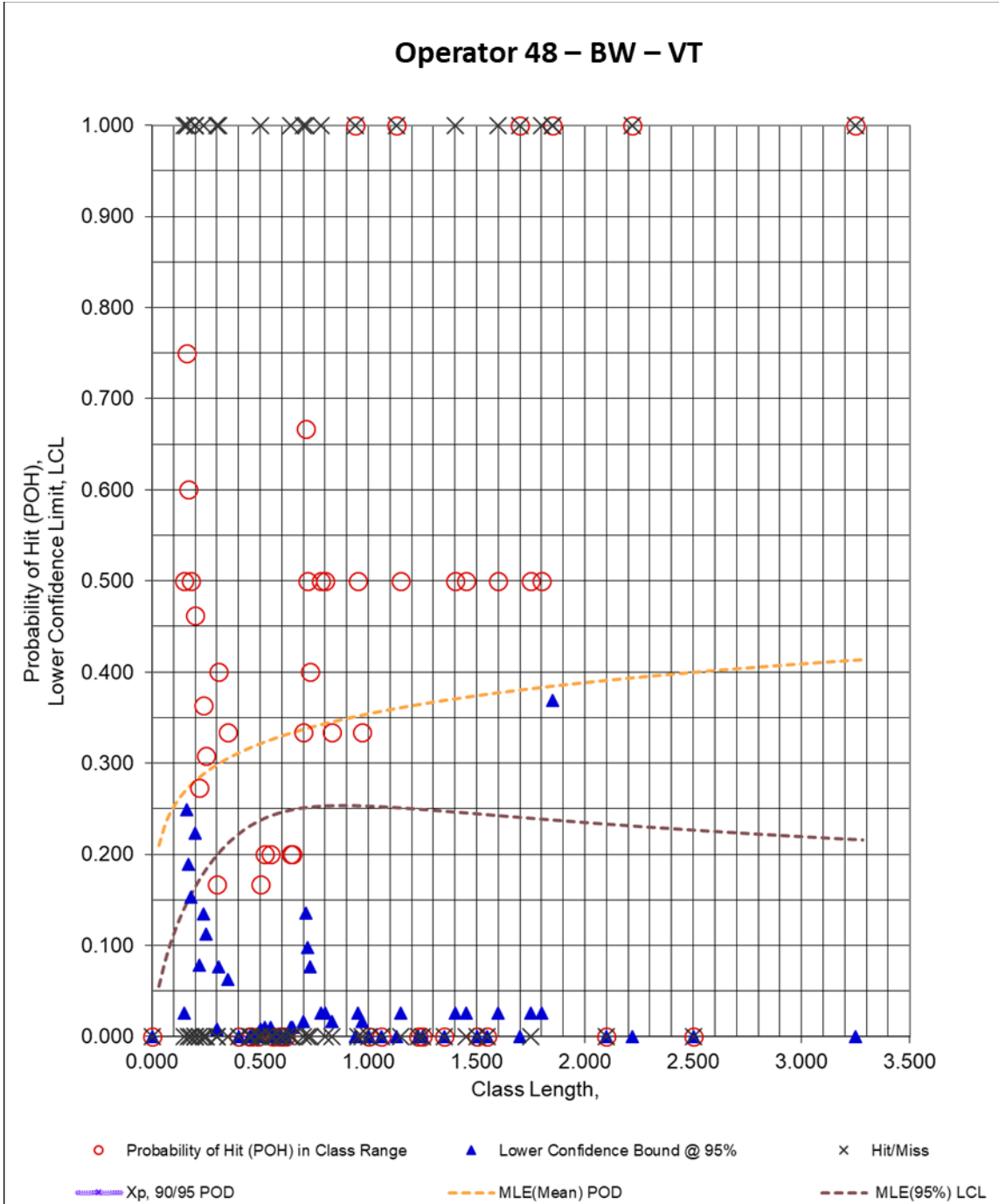


Figure 400. DOEPOD – BW – VT – Operator 48

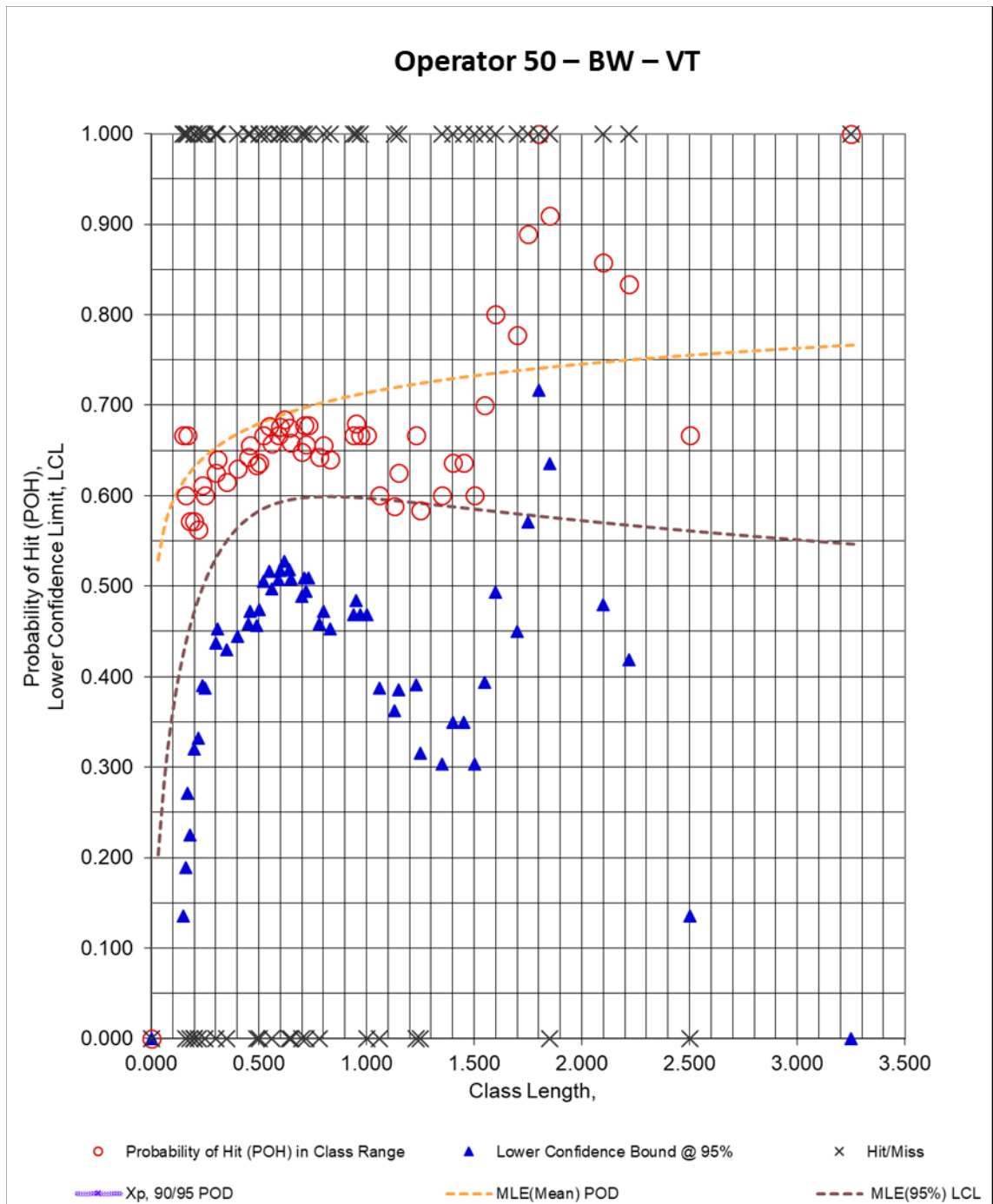


Figure 401. DOEPOD – BW – VT – Operator 50

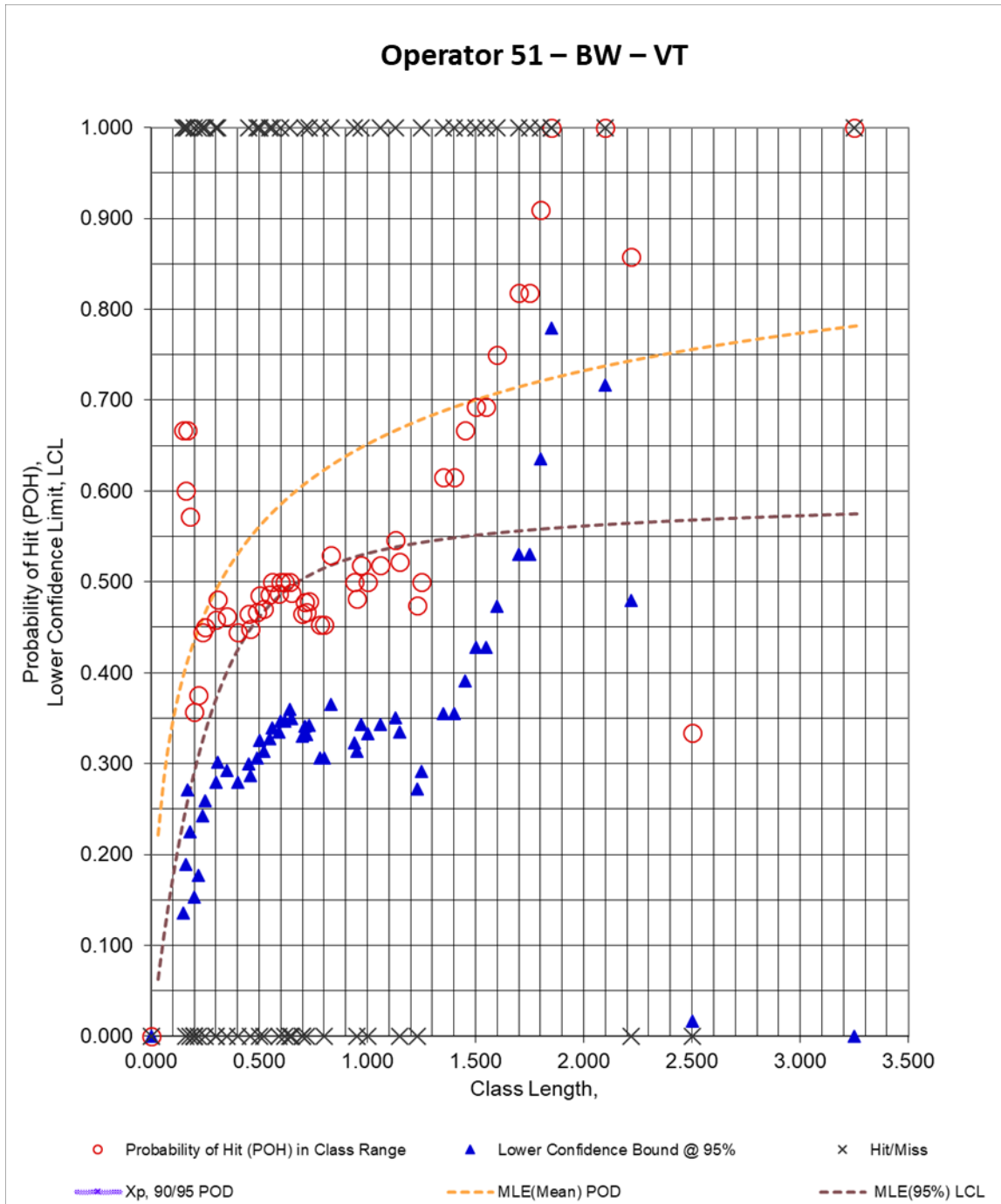


Figure 402. DOEPOD – BW – VT – Operator 51

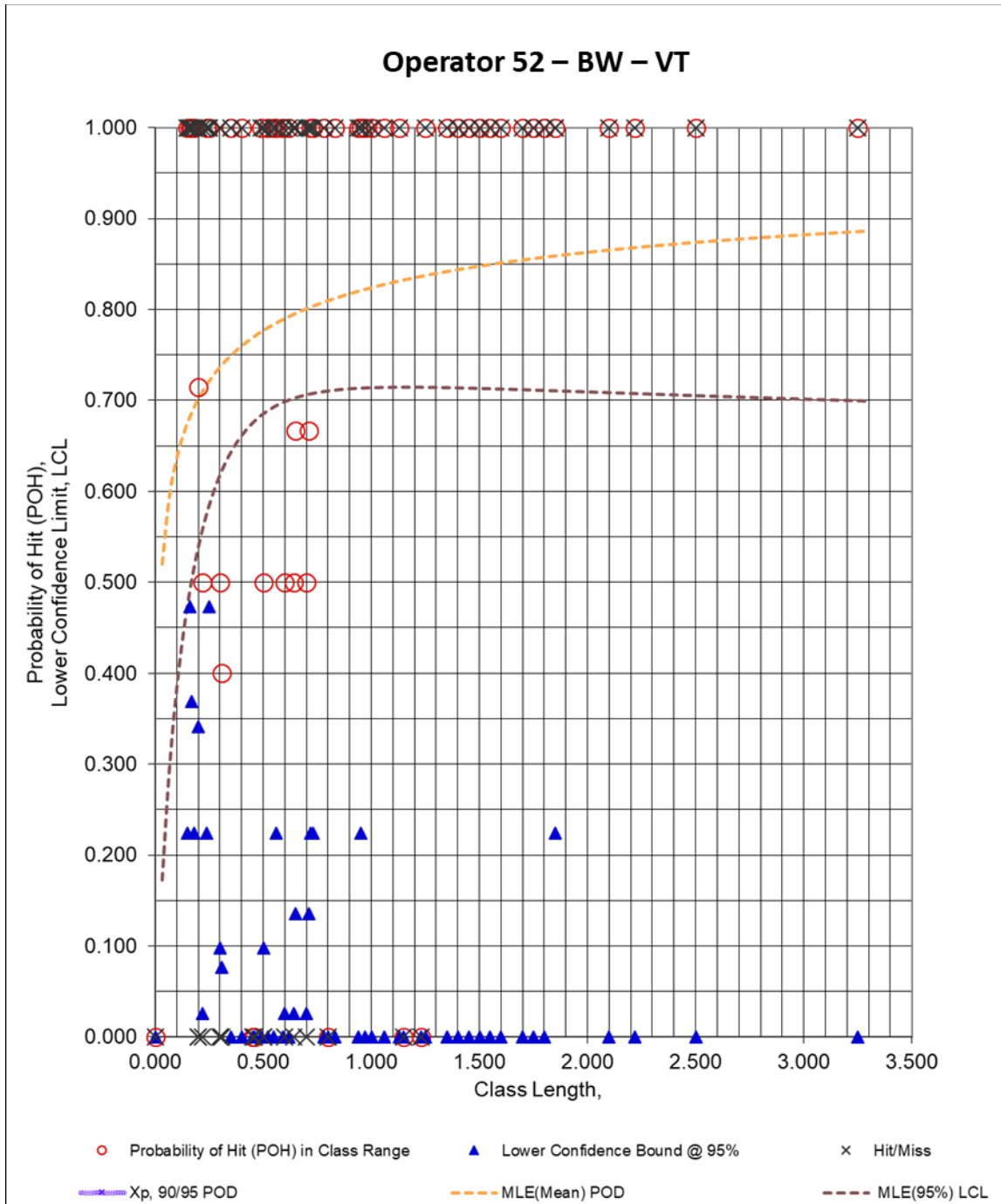


Figure 403. DOEPOD – BW – VT – Operator 52

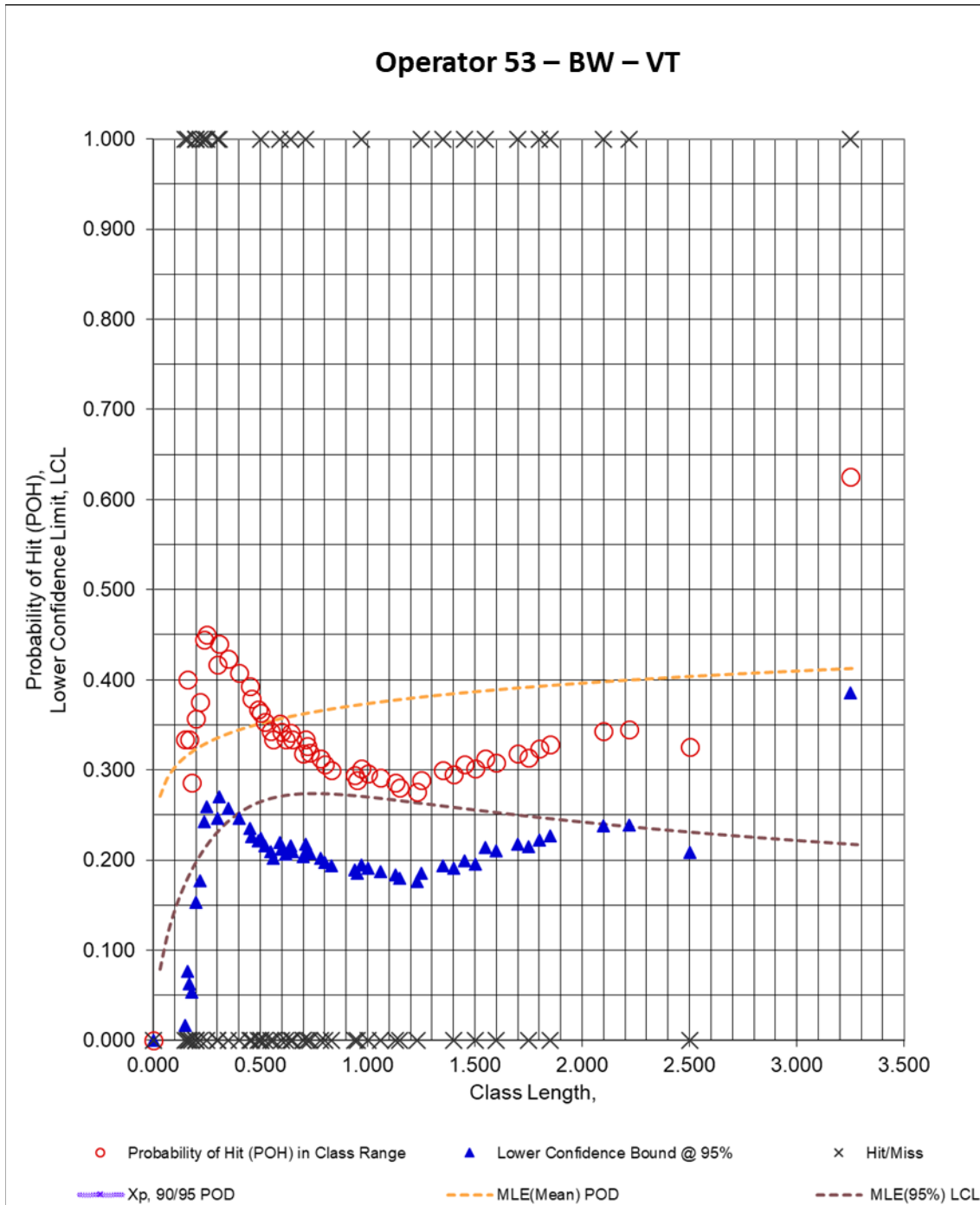


Figure 404. DOEPOD – BW – VT – Operator 53

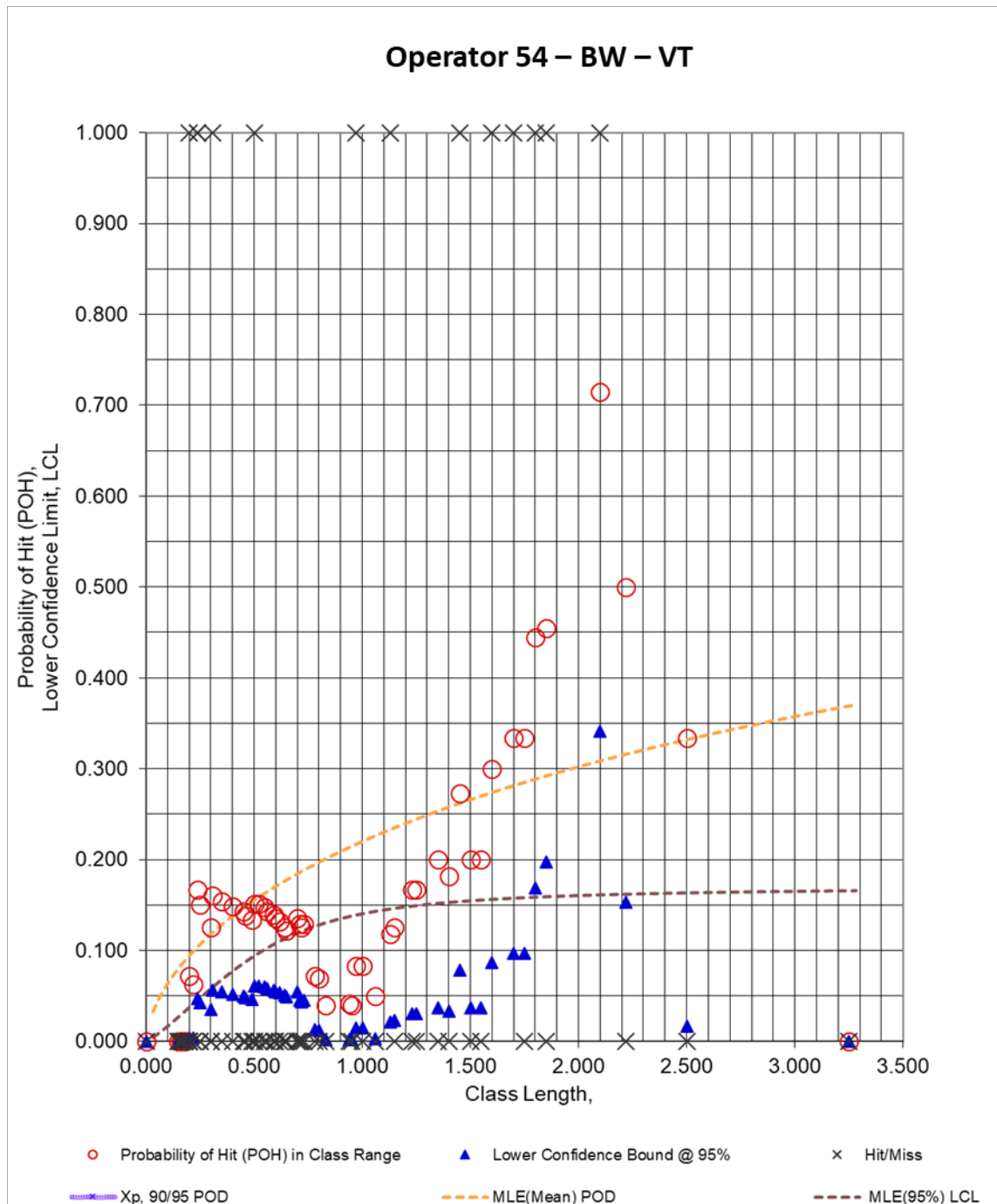


Figure 405. DOEPOD – BW – VT – Operator 54

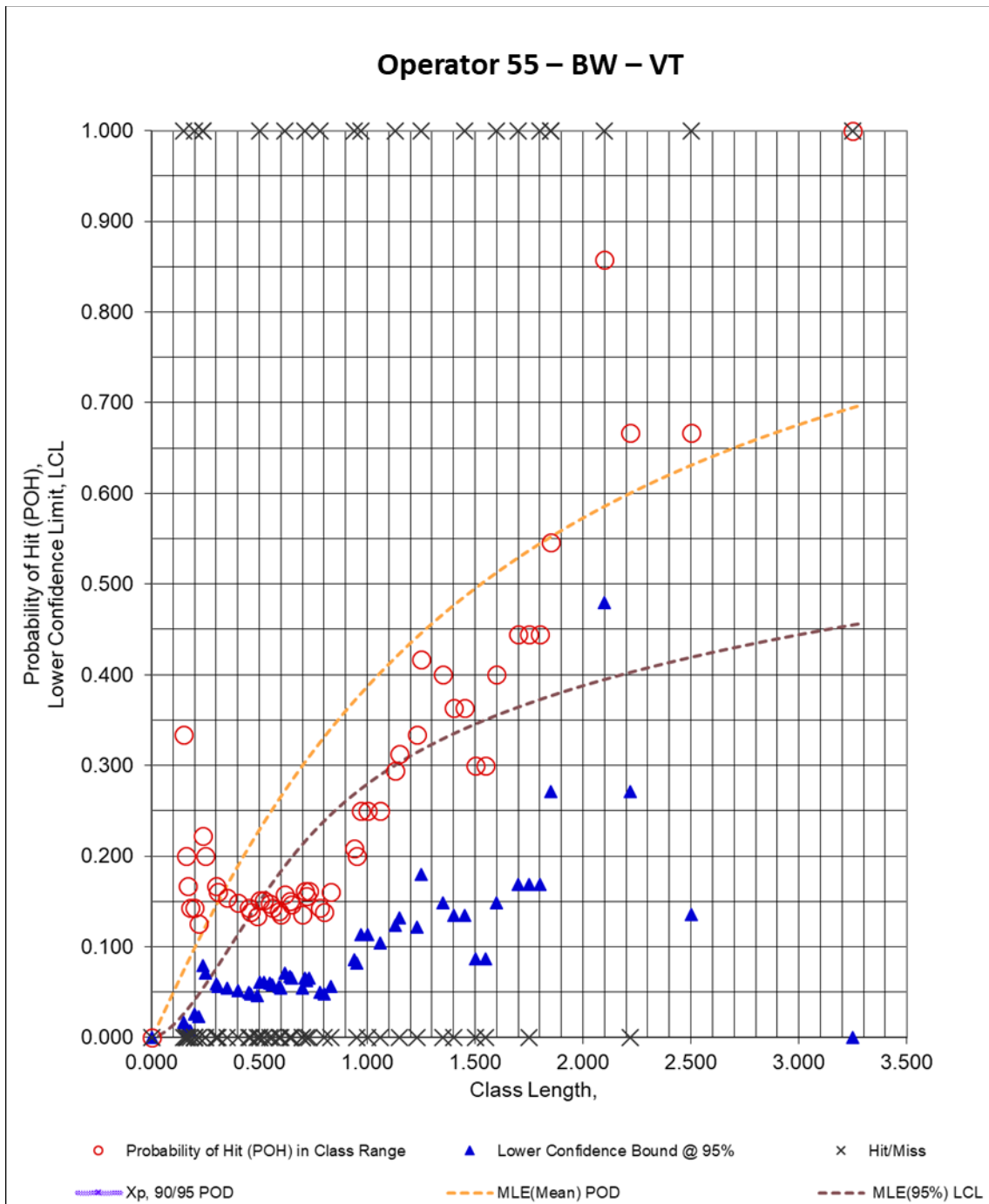


Figure 406. DOEPOD – BW – VT – Operator 55

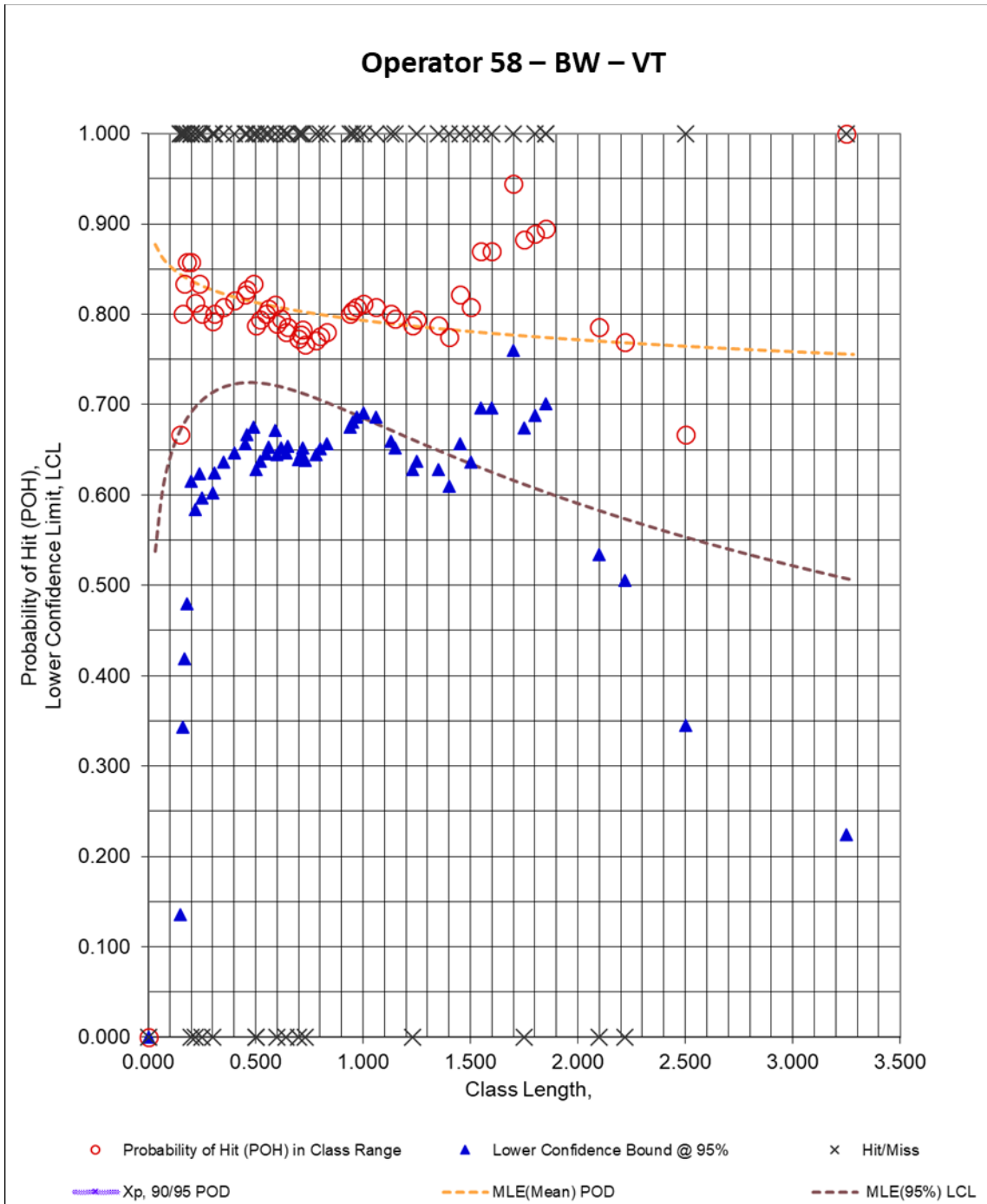


Figure 407. DOEPOD – BW – VT – Operator 58

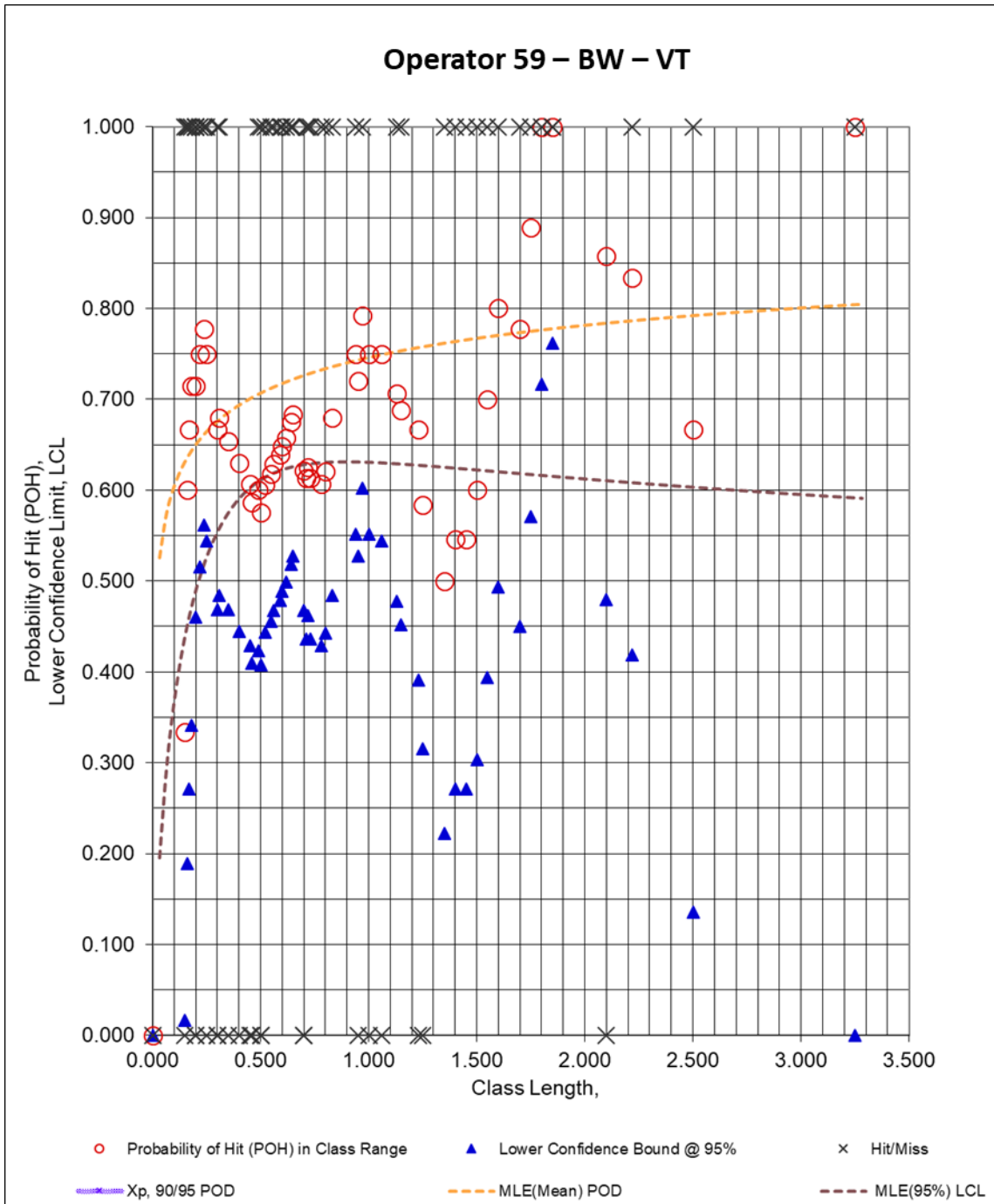


Figure 408. DOEPOD – BW – VT – Operator 59

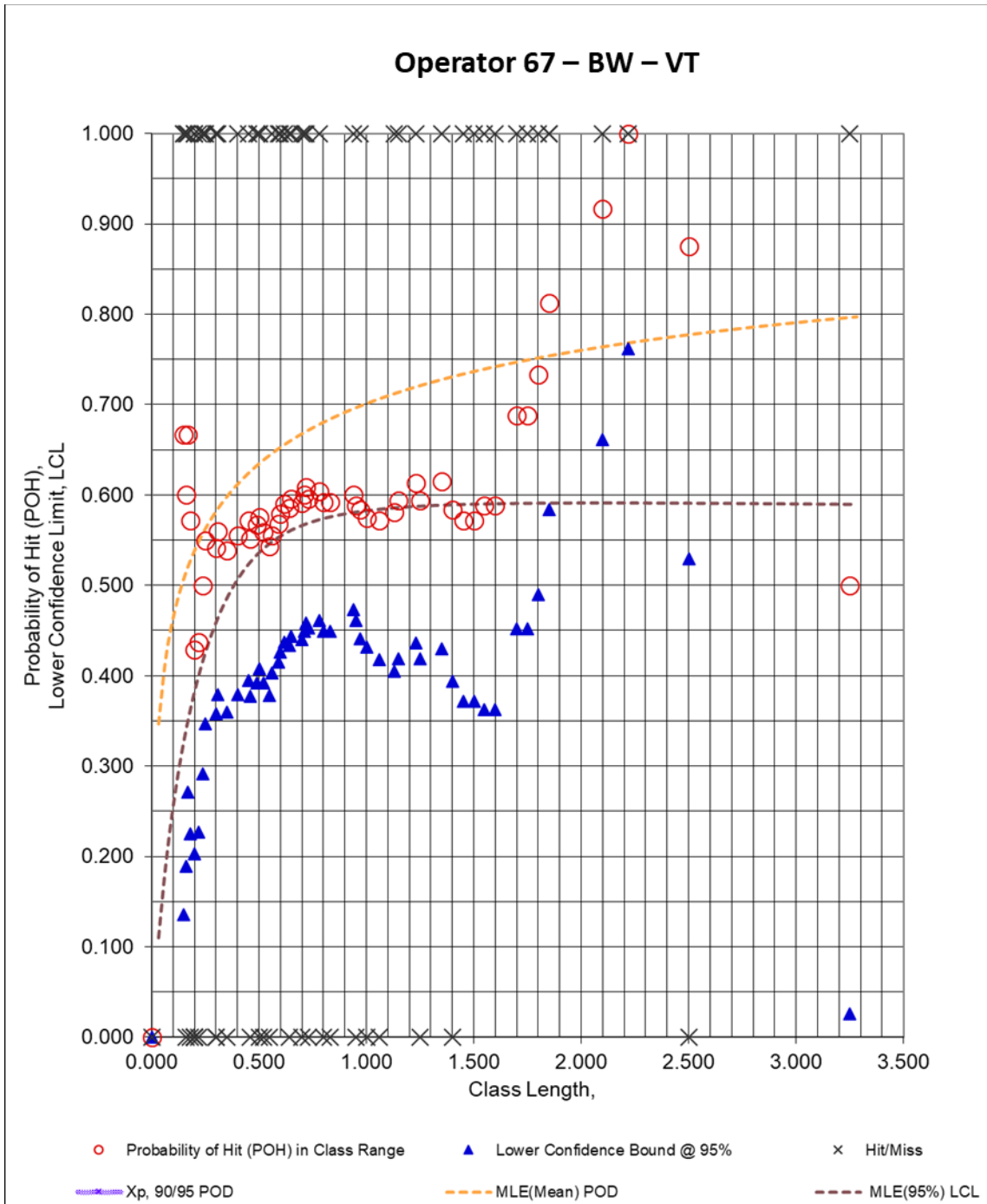


Figure 409. DOEPOD – BW – VT – Operator 67

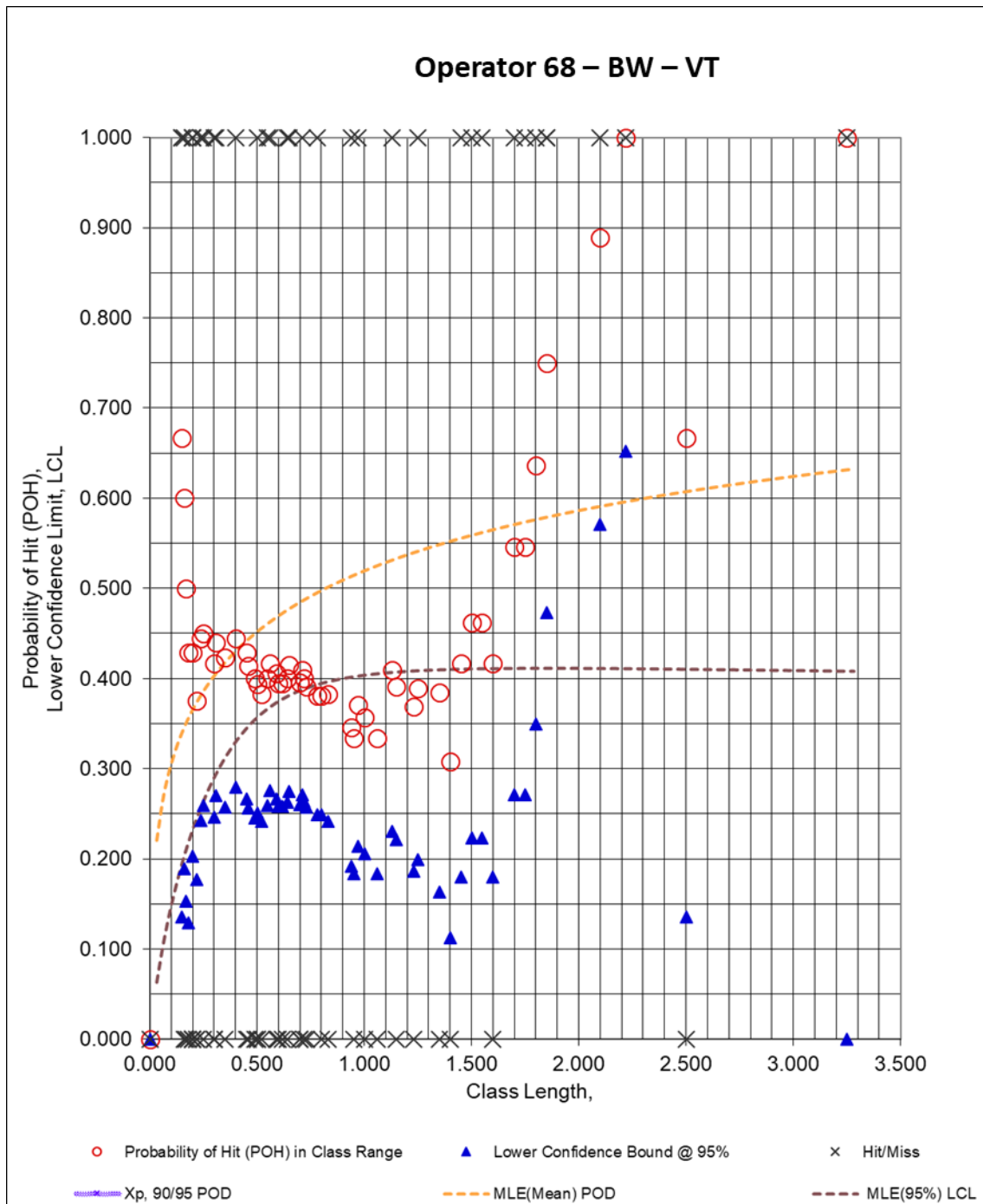


Figure 410. DOEPOD – BW – VT – Operator 68

Appendix G. DOEPOD Plots – DOEPOD Summary Tables for Fillet Welds Panels

Table 1 through Table 5 summarizes DOEPOD fillet welds panels.

Table 1. DOEPOD Summary Table for VT – FW

Operator Number	Hits	Misses	False Calls	90/95 X _{POD} Reached	90/95 X _{POD} [inch]	X _{Best LCL} [inch]	BEST LCL/POH [%]	Probability of False Call [%]	Case #	Recommendations
1	47	42	7	Not Reached		2.45	0.7699	0.0490	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
5	67	22	11	Not Reached		2.1	0.7411	0.0666	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
6	45	44	13	Not Reached		1.9	0.5493	0.0775	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
Operator 11	33	56	5	Not Reached		3.75	0.3684	0.0387	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
14	77	12	20	Not Reached		1	0.5493	0.1063	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
15	88	1	16	Reached	0.9			0.0903	1+	Inspector Qualification CONDITIONAL PASS: Excessive false calls. Explain misses and false calls.
17	52	37	7	Not Reached		1.9	0.6366	0.0490	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
19	44	45	8	Not Reached		1.3	0.5493	0.0549	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
20	61	28	8	Not Reached		0.55	0.7033	0.0549	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .

Operator Number	Hits	Misses	False Calls	90/95 X _{POD} Reached	90/95 X _{POD} [inch]	X _{Best LCL} [inch]	BEST LCL/POH [%]	Probability of False Call [%]	Case #	Recommendations
27	53	36	7	Not Reached		4.3	0.6613	0.0490	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
30	60	29	20	Not Reached		0.95	0.6092	0.1063	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
31	26	63	9	Not Reached		3.8	0.2504	0.0576	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
32	66	23	19	Not Reached		2.05	0.6877	0.1014	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
33	19	70	7	Not Reached		1.4	0.2236	0.0490	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
47	72	17	21	Not Reached		2.5	0.7616	0.1113	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
48	33	56	4	Not Reached		1.5	0.3684	0.0338	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
50	51	38	6	Not Reached		2	0.5493	0.0451	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
51	20	69	3	Not Reached		0.85	0.1893	0.0286	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
52	51	38	8	Not Reached		4.3	0.6877	0.0549	4	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L and the greater of X _{POH} or X _{LCL} .
53	39	50	12	Not Reached		3.8	0.5493	0.0721	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
54	30	59	10	Not Reached		3.95	0.4182	0.0632	7	90/95 X _{POH} is not reached anywhere. Recommend satisfying 2X _L .
55	19	70	5	Not Reached		0.8	0.2008	0.0387	7	90/95 X _{POH} is not reached anywhere. Recommend satisfying 2X _L .

Operator Number	Hits	Misses	False Calls	90/95 X _{POD} Reached	90/95 X _{POD} [inch]	X _{Best LCL} [inch]	BEST LCL/POH [%]	Probability of False Call [%]	Case #	Recommendations
58	68	21	10	Not Reached		1.35	0.5493	0.0632	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
59	46	43	12	Not Reached		0.5	0.4600	0.0721	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
67	61	28	13	Not Reached		4.3	0.6964	0.0775	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
70	46	43	5	Not Reached		3.8	0.5009	0.0387	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .

Table 2. DOEPOD Summary Table for MT with Contrast – FW

Operator Number	Hits	Misses	False Calls	90/95 X _{POD} Reached	90/95 X _{POD} [inch]	X _{Best LCL} [inch]	BEST LCL/POH [%]	Probability of False Call [%]	Case #	Recommendations
5	75	14	13	Not Reached		0.55	0.6070	0.0775	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
6	70	19	9	Not Reached		4.3	0.7942	0.0576	4	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L and the greater of X _{POH} or X _{LCL} .
12	85	4	22	Reached	2.15			0.1161	1	Inspector Qualification CONDITIONAL PASS: Excessive false calls. Explain misses and false calls.
14	89	0	22	Reached	1			0.1161	1	Inspector Qualification CONDITIONAL PASS: Excessive false calls. Explain false calls.
17	74	15	7	Not Reached		1.8	0.6518	0.0490	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
18	85	4	15	Reached	2.15			0.0851	1	Inspector Qualification CONDITIONAL PASS: Excessive false calls. Explain false calls.

Operator Number	Hits	Misses	False Calls	90/95 X _{POD} Reached	90/95 X _{POD} [inch]	X _{Best LCL} [inch]	BEST LCL/POH [%]	Probability of False Call [%]	Case #	Recommendations
19	48	41	3	Not Reached		3.85	0.6070	0.0286	7	90/95 X _{POH} is not reached anywhere. Recommend satisfying 2XL.
23	73	16	5	Not Reached		2.45	0.7998	0.0387	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2XL.
24	71	18	10	Not Reached		2.7	0.7734	0.0632	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2XL.
26	58	31	9	Not Reached		4.3	0.6877	0.0576	4	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L and the greater of X _{POH} or X _{LCL} .
30	85	4	15	Reached	2.8			0.0851	1#	90/95 X _{POD} may be VALIDATED from X _{POD} to X _L . X _p used to satisfy X _L and X _m requirements. An alternate 90/95 X _{POH} is available if X _{podopt} or Optimum X _{POH} (if listed) is also satisfied.
31	86	3	18	Reached	2.8			0.1006	1#	90/95 X _{POD} may be VALIDATED from X _{POH} to X _L . X _p used to satisfy X _L and X _m requirements. An alternate 90/95 X _{POD} is available if X _{podopt} or Optimum X _{POH} (if listed) is also satisfied.
32	79	10	13	Not Reached		2.7	0.8965	0.0775	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
34	82	7	13	Reached	2.15			0.0775	1	Inspector Qualification CONDITIONAL PASS: Excessive false calls. Explain false calls.
39	81	8	12	Not Reached		1	0.6877	0.0721	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
40	88	1	17	Reached	1			0.0954	1	Inspector Qualification CONDITIONAL PASS: Excessive false calls. Explain false calls.
47	89	0	20	Reached	1			0.1063	1	Inspector Qualification CONDITIONAL PASS:

Operator Number	Hits	Misses	False Calls	90/95 X _{POD} Reached	90/95 X _{POD} [inch]	X _{Best LCL} [inch]	BEST LCL/POH [%]	Probability of False Call [%]	Case #	Recommendations
										Excessive false calls. Explain false calls.
48	84	5	15	Reached	1.75			0.0851	2	Inspector Qualification FAIL. Missed large flaws. Excessive false calls. Retrain & retest.
50	88	1	22	Reached	1			0.1161	1	Inspector Qualification CONDITIONAL PASS: Excessive false calls. Explain false calls.
51	81	8	16	Reached	3.3			0.0903	1#	90/95 X _{POD} may be VALIDATED from X _{POH} to X _L . X _p used to satisfy X _L and X _m requirements. An alternate 90/95 X _{POD} is available if X _{podopt} or Optimum X _{POH} (if listed) is also satisfied.
52	84	5	10	Reached	1.75			0.0632	1+	Inspector Qualification CONDITIONAL PASS: Excessive false calls. Explain misses and false calls.
53	86	3	17	Reached	1			0.0954	1+	Inspector Qualification CONDITIONAL PASS: Excessive false calls. Explain Misses and false calls.
54	75	14	11	Not Reached		2.5	0.8153	0.0666	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
55	35	54	2	Not Reached		0.7	0.4182	0.0233	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .

Table 3. DOEPOD Summary Table for MT Without Contrast - FW

Operator Number	Hits	Misses	False Calls	90/95 X _{POD} Reached	90/95 X _{POD} [inch]	X _{Best} LCL [inch]	BEST LCL/POH [%]	Probability of False Call [%]	Case #	Recommendations
1	79	10	10	Reached	2.15			0.0632	1	Inspector Qualification CONDITIONAL PASS: Excessive false calls. Explain false calls.
30	82	7	12	Reached	2.8			0.0721	1	Inspector Qualification CONDITIONAL PASS: Excessive false calls. Explain false calls.
31	84	5	22	Reached	3.3			0.1161	1#	90/95 X _{POD} may be VALIDATED from X _{POD} to X _L . X _p used to satisfy X _L and X _m requirements. An alternate 90/95 X _{POD} is available if X _{podopt} or Optimum X _{POH} (if listed) is also satisfied.
32	82	7	14	Reached	2.15			0.0799	1	Inspector Qualification CONDITIONAL PASS: Excessive false calls. Explain false calls.
35	87	2	9	Reached	1			0.0576	1*	90/95 X _{POD} is reached. X _p used to satisfy X _L and X _m requirements. VALIDATION GAP exists. X _p may VALIDATE between X _p and X _L when causes of Misses are understood and corrected.
39	83	6	19	Reached	1.4			0.1014	1*	90/95 X _{POD} is reached. X _p used to satisfy X _L and alternate X _m requirements. VALIDATION GAP exists. X _p may VALIDATE between X _p and X _L when causes of Misses are understood and corrected.
41	89	0	21	Reached	1			0.1113	1	Inspector Qualification CONDITIONAL PASS: Excessive false calls. Explain false calls.
58	89	0	21	Reached	1			0.1113	1	Inspector Qualification CONDITIONAL PASS:

Operator Number	Hits	Misses	False Calls	90/95 X _{POD} Reached	90/95 X _{POD} [inch]	X _{Best} LCL [inch]	BEST LCL/POH [%]	Probability of False Call [%]	Case #	Recommendations
										Excessive false calls. Explain false calls.
59	82	7	25	Reached	1.75			0.1307	2	Inspector Qualification FAIL. Missed large flaws. Excessive false calls. Retrain & retest.
66	89	0	23	Reached	1			0.1210	1	Inspector Qualification CONDITIONAL PASS: Excessive false calls. Explain false calls.

Table 4. DOEPOD Summary Table for PT - FW

Operator Number	Hits	Misses	False Calls	90/95 X _{POD} Reached	90/95 X _{POD} [inch]	X _{BEST} LCL [inch]	BEST LCL/POH [%]	Probability of False Call [%]	Case #	Recommendations
1	48	41	4	Not Reached		3.95	0.6044	0.0338	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
5	71	18	5	Not Reached		1.55	0.7688	0.0387	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
6	50	39	4	Not Reached		2.15	0.5480	0.0338	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
12	83	6	15	Reached	0.9			0.0851	1	Inspector Qualification CONDITIONAL PASS: Excessive false calls. Explain false calls.
14	82	7	19	Reached	0.8			0.1014	2	Inspector Qualification FAIL. Missed large flaws. Excessive false calls. Retrain & retest.
15	53	36	5	Not Reached		3.95	0.5965	0.0387	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
17	55	34	3	Not Reached		1.55	0.6044	0.0286	6	90/95 X _{POD} is not reached anywhere.

Operator Number	Hits	Misses	False Calls	90/95 X _{POD} Reached	90/95 X _{POD} [inch]	X _{BEST} LCL [inch]	BEST LCL/POH [%]	Probability of False Call [%]	Case #	Recommendations
										Recommend satisfying X _L , X _{POH} , and 2X _L .
19	39	50	1	Not Reached		2.1	0.4793	0.0176	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
21	58	31	3	Not Reached		2.45	0.7791	0.0286	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
22	47	42	1	Not Reached		2.45	0.7791	0.0176	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
30	57	32	14	Not Reached		3.85	0.7033	0.0799	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
32	67	22	5	Not Reached		2.45	0.7933	0.0387	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
35	42	47	2	Not Reached		2.45	0.5493	0.0233	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
38	70	19	9	Not Reached		3.95	0.7417	0.0576	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
39	64	25	6	Not Reached		1.7	0.7066	0.0451	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
40	64	25	5	Not Reached		2.45	0.7484	0.0387	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
41	69	20	4	Not Reached		2.45	0.8368	0.0338	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
47	75	14	7	Not Reached		1	0.5493	0.0490	6	90/95 X _{POD} is not reached anywhere.

Operator Number	Hits	Misses	False Calls	90/95 X _{POD} Reached	90/95 X _{POD} [inch]	X _{BEST} LCL [inch]	BEST LCL/POH [%]	Probability of False Call [%]	Case #	Recommendations
										Recommend satisfying X _L , X _{POH} , and 2X _L .
48	84	5	4	Reached	1.4			0.0338	1	Inspector Qualification CONDITIONAL PASS: At X _p = 2.8 inch. Explain false calls.
50	78	11	8	Not Reached		1	0.5493	0.0549	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
51	82	7	7	Reached	1.4			0.0490	1#	90/95 X _{POD} may be VALIDATED from X _{POD} to X _L . X _p used to satisfy X _L and X _m requirements. An alternate 90/95 X _{POD} is available if X _{podopt} or Optimum X _{POD} (if listed) is also satisfied.
52	65	24	4	Not Reached		1.95	0.8666	0.0338	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
53	82	7	19	Reached	1.4			0.1014	1	Inspector Qualification CONDITIONAL PASS: Excessive false calls. Explain misses and false calls.
54	66	23	6	Not Reached		2.5	0.8012	0.0451	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
55	76	13	7	Not Reached		1.9	0.8190	0.0490	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
58	51	38	3	Not Reached		1.7	0.6070	0.0286	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
59	15	74	0	Not Reached		1.55	0.1376	0.0111	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .

Table 5. DOEPOD Summary Table for UT - FW

Operator Number	Hits	Misses	False Calls	90/95 X_{POD} Reached	90/95 X_{POD} [inch]	X_{Best} LCL [inch]	BEST LCL/POH [%]	Probability of False Call [%]	Case #	Recommendations
61	74	15	12	Not Reached		1.9	0.8190	0.0721	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
62	79	10	12	Not Reached		1.9	0.8719	0.0721	6	90/95 X _{POH} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
63	77	12	10	Not Reached		1	0.5493	0.0632	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .

Appendix H. DOEPOD Plots – DOEPOD Summary Tables for Butt Weld Panels

Table 6 through Table 11 summarizes DOEPOD for butt weld panels.

Table 6. DOEPOD Summary Table for VT – BW

Operator Number	Hits	Misses	False Calls	90/95 X _{POD} Reached	90/95 X _{POD} [inch]	X _{Best} LCL [inch]	BEST LCL/POH [%]	Probability of False Call [%]	Case #	Recommendations
1	46	27	22	Not Reached		0.16	0.472869133	0.18108	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
6	31	42	13	Not Reached		2.22	0.651835849	0.12122	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
11	29	44	7	Not Reached		2.22	0.479294479	0.07691	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
15	62	11	5	Not Reached		0.18	0.606961852	0.06094	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
17	25	48	0	Not Reached		2.1	0.435625449	0.01762	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
20	26	47	6	Not Reached		2.1	0.651835849	0.07079	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
27	61	12	54	Not Reached		1.45	0.818965047	0.3908	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
30	22	51	26	Not Reached		2.22	0.479294479	0.21069	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
31	17	56	4	Not Reached		2.1	0.472869133	0.05317	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
32	28	45	19	Not Reached		2.22	0.651835849	0.15852	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
33	26	47	3	Not Reached		2.22	0.479294479	0.04514	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .

Operator Number	Hits	Misses	False Calls	90/95 X _{POD} Reached	90/95 X _{POD} [inch]	X _{Best} LCL [inch]	BEST LCL/POH [%]	Probability of False Call [%]	Case #	Recommendations
47	53	18	25	Not Reached		0.16	0.472869133	0.20334	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
48	24	49	12	Not Reached		1.85	0.368401017	0.11289	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
50	49	23	12	Not Reached		1.8	0.716868717	0.11289	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
51	42	31	19	Not Reached		1.85	0.779079128	0.15852	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
52	57	16	46	Not Reached		0.16	0.472869133	0.3386	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
53	26	47	5	Not Reached		3.25	0.385457461	0.06094	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
54	13	60	3	Not Reached		2.1	0.341259658	0.04514	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
55	21	52	9	Not Reached		2.1	0.479294479	0.09041	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
58	59	14	68	Not Reached		1.7	0.759633946	0.41071	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
59	52	21	40	Not Reached		1.85	0.761593531	0.29849	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
67	47	26	3	Not Reached		2.22	0.761593531	0.04514	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
68	34	39	4	Not Reached		2.22	0.651835849	0.05317	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .

Table 7. DOEPOD Summary Table for MT with Contrast – BW

Operator Number	Hits	Misses	False Calls	90/95 X_{POD} Reached	90/95 X_{POD} [inch]	X_{Best LCL} [inch]	BEST LCL/POH [%]	Probability of False Call [%]	Case #	Recommendations
6	23	50	8	Not Reached		1.85	0.529913 624	0.08619	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
17	35	38	4	Not Reached		2.22	0.761593 531	0.05317	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
19	22	51	3	Not Reached		2.5	0.687657 409	0.04514	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
23	46	26	58	Not Reached		1.45	0.661319 995	0.41637	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
24	35	36	38	Not Reached		2.1	0.651835 849	0.28493	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
26	25	48	17	Not Reached		3.25	0.529913 624	0.149	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
29	52	21	29	Not Reached		3.25	0.683659 401	0.22271	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
31	51	22	32	Not Reached		1	0.472869 133	0.24367	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
32	54	19	18	Not Reached		0.59	0.472869 133	0.15687	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
47	58	15	30	Not Reached		0.71	0.844444 027	0.22972	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
48	45	28	34	Not Reached		1.85	0.807363 152	0.25752	6	90/95 X _{POD} is not reached anywhere.

Operator Number	Hits	Misses	False Calls	90/95 X_{POD} Reached	90/95 X_{POD} [inch]	X_{Best LCL} [inch]	BEST LCL/POH [%]	Probability of False Call [%]	Case #	Recommendations
										Recommend satisfying X _L , X _{POH} , and 2X _L .
50	60	12	76	Not Reached		0.95	0.844444 027	0.45833	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
51	57	16	40	Not Reached		1.45	0.870669 699	0.29849	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
52	58	15	27	Not Reached		0.71	0.844444 027	0.21802	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
53	46	27	42	Not Reached		2.5	0.687831 825	0.31195	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
54	40	33	22	Not Reached		2.22	0.761593 531	0.18108	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
55	52	21	24	Not Reached		2.5	0.761593 531	No probability	4	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L and the greater of X _{POH} or X _{LCL} .

Table 8. DOEPOD Summary Table for MT Without Contrast – BW

Operator Number	Hits	Misses	False Calls	90/95 X _{POD} Reached	90/95 X _{POD} [inch]	X _{Best} LCL [inch]	BEST LCL/POH [%]	Probability of False Call [%]	Case #	Recommendations
1	56	17	26	Not Reached		0.5	0.368401017	0.21069	5	This is a survey data set. 90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L and Survey X _{POH} (if listed)
30	34	39	11	Not Reached		1.8	0.687657409	0.10452	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
31	51	22	28	Not Reached		1	0.472869133	0.22531	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
32	44	29	18	Not Reached		1.8	0.761593531	0.15687	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
35	39	34	5	Not Reached		1.85	0.736044594	0.06094	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
39	39	34	15	Not Reached		3.25	0.683659401	0.13314	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
40	63	10	16	Not Reached		0.5	0.368401017	0.14109	5	This is a survey data set. 90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L and survey X _{POH} (if listed)
41	69	4	32	Reached	1.06			0.24367	1#	90/95 X _{POH} may be VALIDATED from X _{POH} to X _L . X _p used to satisfy X _L and X _m requirements. An alternate 90/95 X _{POD} is available if X _{podopt} or optimum X _{POH} (if listed) is also satisfied.
58	68	5	28	Not Reached		0.2	0.479294479	0.22531	5	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L and X _{POH} .
59	37	36	25	Not Reached		2.22	0.606961852	0.20334	7	90/95 X _{POH} is not reached anywhere. Recommend satisfying 2X _L .
66	47	26	6	Not Reached		3.25	0.606961852	0.07079	4	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L and the greater of X _{POH} or X _{LCL} .

Table 9. DOEPOD Summary Table for PT – BW

Operator Number	Hits	Misses	False Calls	90/95 X _{POD} Reached	90/95 X _{POD} [inch]	X _{Best} LCL [inch]	BEST LCL/POH [%]	Probability of False Call [%]	Case #	Recommendations
1	38	35	7	Not Reached		2.22	0.720602012	0.07691	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
6	39	34	7	Not Reached		2.22	0.687831825	0.07691	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
15	41	32	37	Not Reached		2.22	0.636559056	0.27811	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
17	40	33	8	Not Reached		0.64	0.606961852	0.08619	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
19	26	47	4	Not Reached		3.25	0.51560788	0.05317	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
21	34	39	12	Not Reached		2.22	0.606961852	0.11289	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
22	36	37	6	Not Reached		2.22	0.687831825	0.07079	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
30	20	53	8	Not Reached		2.22	0.570865861	0.08619	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
32	29	44	8	Not Reached		2.22	0.720602012	0.08619	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
35	36	37	17	Not Reached		2.22	0.716868717	0.149	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
37	30	43	19	Not Reached		1.85	0.472869133	0.15852	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
38	33	40	15	Not Reached		0.97	0.606961852	0.13314	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
39	25	48	14	Not Reached		2.22	0.716868717	0.12515	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
40	28	45	12	Not Reached		1.85	0.651835849	0.11289	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .

Operator Number	Hits	Misses	False Calls	90/95 X _{POD} Reached	90/95 X _{POD} [inch]	X _{Best} LCL [inch]	BEST LCL/POH [%]	Probability of False Call [%]	Case #	Recommendations
41	37	36	14	Not Reached		2.22	0.687831825	0.12515	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
47	43	30	16	Not Reached		2.22	0.604354808	0.14109	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
48	61	12	116	Not Reached		0.22	0.570865861	0.76118	5	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L and X _{POH} .
50	45	28	21	Not Reached		2.22	0.589897733	0.17359	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
51	43	29	31	Not Reached		2.22	0.716868717	0.23671	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
52	46	27	38	Not Reached		2.22	0.748390959	0.28493	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
53	43	30	25	Not Reached		0.97	0.368401017	0.20334	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
54	35	38	16	Not Reached		2.22	0.677004646	0.14109	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
55	43	30	26	Not Reached		2.22	0.651835849	0.21069	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
58	41	32	13	Not Reached		2.22	0.748390959	0.12122	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
59	37	36	13	Not Reached		2.22	0.720602012	0.12122	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .

Table 10. DOEPOD Summary Table for UT – BW

Operator Number	Hits	Misses	False Calls	90/95 X_{POD} Reached	90/95 X_{POD} [inch]	X_{Best} LCL [inch]	BEST LCL/ POH [%]	Probability of False Call [%]	Case #	Recommendations
1	41	32	19	Not Reached		3.25	0.63655905 6	0.15852	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
6	21	52	18	Not Reached		0.5	0.47286913 3	0.15687	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
11	41	32	19	Not Reached		1.6	0.68765740 9	0.15852	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
15	46	27	39	Not Reached		2.1	0.71686871 7	0.29172	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
17	15	58	5	Not Reached		2.22	0.35440465 9	0.06094	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
Operator 19	15	58	4	Not Reached		0.83	0.22360609 6	0.05317	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
25	47	26	10	Not Reached		0.73	0.52932458 2	0.09913	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
26	33	40	5	Not Reached		0.97	0.36840101 7	0.06094	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
29	55	18	22	Not Reached		1.45	0.81896504 7	0.18108	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
30	56	17	48	Not Reached		0.97	0.60696185 2	0.35179	6	90/95 X _{POD} is not reached anywhere. Recommend

Operator Number	Hits	Misses	False Calls	90/95 X _{POD} Reached	90/95 X _{POD} [inch]	X _{Best} LCL [inch]	BEST LCL/ POH [%]	Probability of False Call [%]	Case #	Recommendations
										satisfying X _L , X _{POH} , and 2X _L .
33	46	27	15	Not Reached		2.1	0.71686871 7	0.13314	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
Operator 34	24	49	5	Not Reached		3.25	0.71686871 7	0.06094	4	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L and the greater of X _{POH} or X _{LCL} .
36	28	44	6	Not Reached		1.85	0.71686871 7	0.07079	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
37	39	34	3	Not Reached		1.75	0.79418412 9	0.04514	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
38	62	11	58	Not Reached		1.23	0.82092457 3	0.41637	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
44	51	22	32	Not Reached		0.2	0.47929447 9	0.24367	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
45	50	23	25	Not Reached		1.13	0.74839095 9	0.20334	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
46	49	24	24	Not Reached		2.22	0.79418412 9	0.19595	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
48	35	38	4	Not Reached		0.97	0.36840101 7	0.05317	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .

Operator Number	Hits	Misses	False Calls	90/95 X _{POD} Reached	90/95 X _{POD} [inch]	X _{BEST} LCL [inch]	BEST LCL/ POH [%]	Probability of False Call [%]	Case #	Recommendations
49	47	26	8	Not Reached		0.73	0.54928154	0.08619	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
55	26	47	32	Not Reached		1.6	0.54928154	0.24367	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
56	34	39	13	Not Reached		2.5	0.687657409	0.12122	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
57	47	26	11	Not Reached		0.8	0.54928154	0.10452	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
59	35	38	14	Not Reached		0.97	0.368401017	0.12515	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
60	17	56	4	Not Reached		3.25	0.349807606	0.05317	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .

Table 11. DOEPOD Summary Table for PAUT – BW

Operator Number	Hits	Misses	False Calls	90/95 X _{POD} Reached	90/95 X _{POD} [inch]	X _{BEST} LCL [inch]	BEST LCL/ POH [%]	Probability of False Call [%]	Case #	Recommendations
36	32	41	5	Not Reached		2.22	0.482353887	0.06094	7	90/95 X _{POD} is not reached anywhere. Recommend satisfying 2X _L .
42	60	13	15	Not Reached		0.31	0.716868717	0.13314	6	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L , X _{POH} , and 2X _L .
43	55	18	12	Not Reached		0.64	0.368401017	0.11289	5	90/95 X _{POD} is not reached anywhere. Recommend satisfying X _L and X _{POH} .

Appendix I. Breakdown of Individual Participants by Different Methods

Table 12 shows the list of participants by different NDE methods for BW and Table 13 shows the list of participants by different NDE methods for FW.

Table 12. List of Participants by Different NDE Methods for BW

VT	PT	MT with Contrast	MT No Contrast	UT	PAUT
1	1	6	1	1	36
6	6	17	30	6	42
11	15	19	31	11	43
15	17	23	32	15	
17	19	24	35	17	
19	21	26	39	19	
20	22	29	40	25	
27	30	30	41	26	
30	32	31	58	29	
31	35	32	59	30	
32	37	39	66	33	
33	38	47		36	
47	39	48		37	
48	40	50		38	
50	41	51		44	
51	47	52		45	
52	48	53		46	
53	50	54		48	
54	51	55		49	
55	52			55	
58	53			56	
59	54			57	
67	55			59	
68	58			60	
	59			69	
24	25	19	11	25	3

Table 13. List of Participants by Different NDE Methods for FW

VT	PT	MT with Contrast	MT No Contrast	UT
1	1	5	1	61
5	5	6	30	62
6	6	12	31	63
11	12	14	32	
14	14	17	35	
15	15	18	39	
17	17	19	41	
19	19	23	58	
20	21	24	59	
27	22	26	66	
30	30	30		
31	32	31		
32	35	32		
33	38	34		
47	39	39		
48	40	40		
50	41	47		
51	47	48		
52	48	50		
53	50	51		
54	51	52		
55	52	53		
58	53	54		
59	54	55		
67	55			
70	58			
	59			
26	27	24	10	3

Abbreviations and Acronyms

ACRONYMS	EXPLANATION
BW	Butt Weld
$X_{\text{BEST LCL}}$	Class length (flaw size) exhibiting the maximum LCL
X_{POD}	Class length at which the lower confidence limit (value) is 0.90 or greater (90/95 POD) @ 95% confidence
X_{POH}	Class length where there are no misses above this class length, and POH = 1 above this class length
DOEPOD	Design of Experiments Probability of Detection
FW	Fillet Welds
X_L	Largest Class Length in Entire Dataset
NDE	Nondestructive Evaluation
PT	Penetrant Testing
PAUT	Phased Array Ultrasonic Testing
POD	Probability of Detection
POH	Probability of Hits
UT	Ultrasonic Testing
VT	Visual Testing