



*Università degli Studi di Ferrara*  
*Dipartimento di Fisica e Scienze della Terra*  
*via Saragat, 1 - I-44122 Ferrara - Italy*  
*segreteria: 0532.974724 - fax: 0532.974767 - P.IVA: IT 00434690384 - C.F.: 80007370382*

# **Microzonazione sismica del Comune di Sant'Agostino**

## **Allegato C**

### **Indice del Potenziale di Liquefazione**

**Convenzione di Ricerca 2013-2015**

Università degli Studi di Ferrara – Comune di Sant'Agostino (FE)



Ferrara, 2 settembre, 2014



<i>Coordinamento dello studio di Microzonazione Sismica:</i>	<i>Prof. Riccardo Caputo</i>
<i>Redazione della relazione</i>	<i>Dott.ssa Ambra Mantovani</i> <i>Prof. Riccardo Caputo</i>
<i>Creazione database dei dati geotecnici e geofisici:</i>	<i>Dott.ssa Ambra Mantovani</i> <i>Dott. Luca Minarelli</i>
<i>Realizzazione indagini geofisiche:</i>	<i>Dott.ssa Ambra Mantovani</i> <i>Dott. Nasser Abu-Zeid</i> <i>Prof. Riccardo Caputo</i> <i>Dott. Geol. Gabriele Tarabusi</i>
<i>Analisi pericolosità di liquefazione</i>	<i>Dott.ssa Ambra Mantovani</i> <i>Prof. Riccardo Caputo</i> <i>Dott. Geol. Gabriele Tarabusi</i>
<i>Elaborazione tavole cartografiche:</i>	<i>Dott.ssa Ambra Mantovani</i> <i>Prof. Riccardo Caputo</i> <i>Prof. Marco Stefani</i> <i>Dott. Luca Minarelli</i>
<i>Mappatura effetti di sito</i>	<i>Prof. Riccardo Caputo</i> <i>Dott. George Papathanassiou</i> <i>Dott. Luca Minarelli</i> <i>GdL liquefazioni RER-DPC</i>



## **Indice**

<b>Generalità sull'Indice di Potenziale Liquefazione</b>	4
<b>Indice dei grafici</b>	6
<b>Grafici dell'indice <math>I_L</math></b>	14
<b>Riferimenti bibliografici</b>	89



## Generalità sull'Indice di Potenziale Liquefazione

L'Indice del Potenziale di Liquefazione  $I_L$  (o *Liquefaction Potential Index*, LPI) proposto da Iwasaki et al. (1982) è un parametro di sintesi che quantifica i possibili effetti della liquefazione in un determinato sito, sulla base i) della severità dell'azione sismica, in termini di magnitudo ed accelerazione e ii) di profondità, spessore e valore del fattore di sicurezza degli strati liquefacibili. L'indice viene così definito:

$$I_L = \int_0^{z_{crit}} F(z) \cdot w(z) \cdot dz \quad [1]$$

dove  $z_{crit}$  è la profondità massima alla quale gli strati liquefatti producono effetti in superficie (generalmente pari a 20 m),  $F(z)$  è una variabile con valori compresi tra 0 e 1, definita per

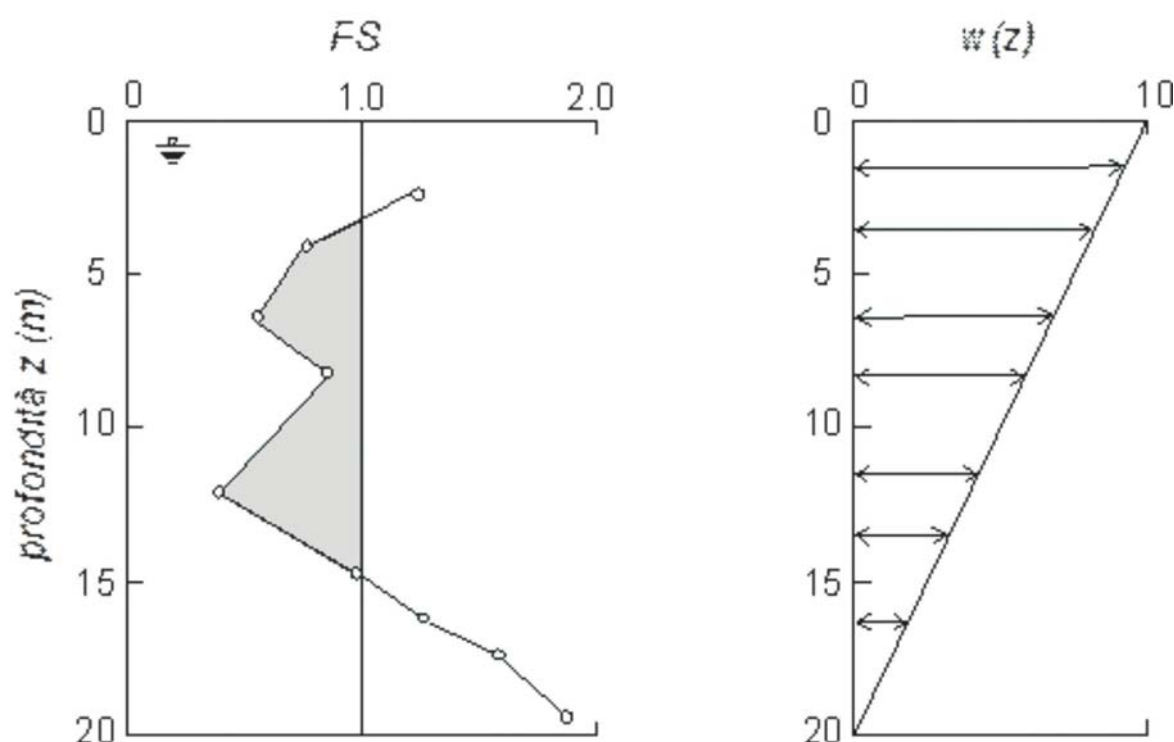


Figura 1 - Rappresentazione grafica della procedura per il calcolo dell'Indice del Potenziale di liquefazione ( $I_L$ ). Il grafico di sinistra, mostra l'andamento del fattore di sicurezza ( $F_S$ ) in funzione della profondità e l'area in grigio evidenzia i livelli potenzialmente suscettibili di liquefazione, mentre il grafico a destra mostra l'andamento della funzione peso  $w(z)$  (equazione [1]).





ogni intervallo di profondità  $0 \leq z \leq z_{crit}$  in funzione del valore che, a quella profondità, assume il valore di sicurezza alla liquefazione ( $FS$ , Figura 1) così definito

$$\begin{aligned} \cdot & \quad F = 1 - FS \quad \text{se } FS \leq 1.0 \\ \cdot & \quad F = 0 \quad \quad \quad \text{se } FS > 1.0 \end{aligned}$$

mentre  $w(z)$  è un fattore di peso, funzione della profondità (Figura 1),

$$w(z) = 10 - 0.5 \cdot z \quad [2]$$

Nelle pagine successive sono riportati i grafici di ciascuna penetrometria analizzata mediante il suddetto approccio dove si può osservare l'andamento dell'Indice del Potenziale di Liquefazione con la profondità.

Nella Tavola 4 (Allegato D) "Carta dei fattori di amplificazione e rischio di liquefazione", i valori puntuali di  $I_L$  sono stati raggruppati in tre classi sulla base del rischio di liquefazione semplificando la classificazione proposta da Sonmez (2003)

$$\begin{aligned} 0 \leq IL \leq 2 & \quad \text{corrispondente a rischio nullo o basso} \\ 2 < IL \leq 5 & \quad \text{corrispondente a rischio medio} \\ 5 < IL \leq 15 & \quad \text{corrispondente a rischio elevato} \end{aligned}$$



**Indice dei grafici dell'indice di liquefazione  $I_L$**

Grafico 1 - 185130B002	15	Grafico 31 - 185130C036	20
Grafico 2 - 185130B003	15	Grafico 32 - 185130C041	20
Grafico 3 - 185130B004	15	Grafico 33 - 185130C043	20
Grafico 4 - 185130B005	15	Grafico 34 - 185130C046	20
Grafico 5 - 185130B501	15	Grafico 35 - 185130C047	20
Grafico 6 - 185130B502	15	Grafico 36 - 185130C048	20
Grafico 7 - 185130B503	16	Grafico 37 - 185130C049	21
Grafico 8 - 185130B504	16	Grafico 38 - 185130C050	21
Grafico 9 - 185130B995	16	Grafico 39 - 185130C051	21
Grafico 10 - 185130B996	16	Grafico 40 - 185130C127	21
Grafico 11 - 185130B998	16	Grafico 41 - 185130C128	21
Grafico 12 - 185130B999	16	Grafico 42 - 185130C130	21
Grafico 13 - 185130C001	17	Grafico 43 - 185130C131	22
Grafico 14 - 185130C002	17	Grafico 44 - 185130C132	22
Grafico 15 - 185130C003	17	Grafico 45 - 185130C133	22
Grafico 16 - 185130C004	17	Grafico 46 - 185130C134	22
Grafico 17 - 185130C005	17	Grafico 47 - 185130C135	22
Grafico 18 - 185130C006	17	Grafico 48 - 185130C136	22
Grafico 19 - 185130C007	18	Grafico 49 - 185130C137	23
Grafico 20 - 185130C008	18	Grafico 50 - 185130C138A	23
Grafico 21 - 185130C009	18	Grafico 51 - 185130C138B	23
Grafico 22 - 185130C010	18	Grafico 52 - 185130C139	23
Grafico 23 - 185130C011	18	Grafico 53 - 185130C140A	23
Grafico 24 - 185130C012	18	Grafico 54 - 185130C140B	23
Grafico 25 - 185130C013	19	Grafico 55 - 185130C140C	24
Grafico 26 - 185130C014	19	Grafico 56 - 185130C140D	24
Grafico 27 - 185130C015	19	Grafico 57 - 185130C141A	24
Grafico 28 - 185130C033	19	Grafico 58 - 18130C141B	24
Grafico 29 - 185130C034	19	Grafico 59 - 185130C141C	24
Grafico 30 - 185130C035	19	Grafico 60 - 185130C142	24



Grafico 61 - 185130C143A	25	Grafico 92 - 185130C180	30
Grafico 62 - 185130C143B	25	Grafico 93 - 185130C192	30
Grafico 63 - 185130C144	25	Grafico 94 - 185130C193	30
Grafico 64 - 185130C145A	25	Grafico 95 - 185130C402	30
Grafico 65 - 185130C145B	25	Grafico 96 - 185130C403	30
Grafico 66 - 185130C145C	25	Grafico 97 - 185130C404	31
Grafico 67 - 185130C155	26	Grafico 98 - 185130C405	31
Grafico 68 - 185130C156	26	Grafico 99 - 185130C406	31
Grafico 69 - 185130C157	26	Grafico 100 - 185130C407	31
Grafico 70 - 185130C158	26	Grafico 101 - 185130C408	31
Grafico 71 - 185130C159	26	Grafico 102 - 185130C409	31
Grafico 72 - 185130C160	26	Grafico 103 - 185130C412	32
Grafico 73 - 185130C161	27	Grafico 104 - 185130C413	32
Grafico 74 - 185130C162	27	Grafico 105 - 185130C416	32
Grafico 75 - 185130C163	27	Grafico 106 - 185130C418	32
Grafico 76 - 185130C164	27	Grafico 107 - 185130C428	32
Grafico 77 - 185130C165	27	Grafico 108 - 185130C987	32
Grafico 78 - 185130C166	27	Grafico 109 - 185130C988	33
Grafico 79 - 185130C167	28	Grafico 110 - 185130C989	33
Grafico 80 - 185130C168	28	Grafico 111 - 185130C990	33
Grafico 81 - 185130C169	28	Grafico 112 - 185130C991	33
Grafico 82 - 185130C170	28	Grafico 113 - 185130C992	33
Grafico 83 - 185130C171	28	Grafico 114 - 185130C993	33
Grafico 84 - 185130C172	28	Grafico 115 - 185130C994	34
Grafico 85 - 185130C173	29	Grafico 116 - 185130C995	34
Grafico 86 - 185130C174	29	Grafico 117 - 185130C996	34
Grafico 87 - 185130C175	29	Grafico 118 - 185130C997	34
Grafico 88 - 185130C176	29	Grafico 119 - 185130C998	34
Grafico 89 - 185130C177	29	Grafico 120 - 185130C999	34
Grafico 90 - 185130C178	29	Grafico 121 - 185130E040	35
Grafico 91 - 185130C179	30	Grafico 122 - 185130E042	35



Grafico 123 - 185130E044	35	Grafico 154 - 185130U512	40
Grafico 124 - 185130E045	35	Grafico 155 - 185130U513	40
Grafico 125 - 185130E427	35	Grafico 156 - 185130U514	40
Grafico 126 - 185130E430	35	Grafico 157 - 185140B001	41
Grafico 127 - 185130E431	36	Grafico 158 - 185140C001	41
Grafico 128 - 185130E432	36	Grafico 159 - 185140C174	41
Grafico 129 - 185130E433	36	Grafico 160 - 185140C175	41
Grafico 130 - 185130E434	36	Grafico 161 - 185140C222	41
Grafico 131 - 185130U004	36	Grafico 162 - 185140C249A	41
Grafico 132 - 185130U005	36	Grafico 163 - 185140C249B	42
Grafico 133 - 185130U006	37	Grafico 164 - 185140C249C	42
Grafico 134 - 185130U007	37	Grafico 165 - 185140C250	42
Grafico 135 - 185130U008	37	Grafico 166 - 185140C255	42
Grafico 136 - 185130U009	37	Grafico 167 - 185140U002	42
Grafico 137 - 185130U010	37	Grafico 168 - 185140U003	42
Grafico 138 - 185130U011	37	Grafico 169 - 185130U004	43
Grafico 139 - 185130U019	38	Grafico 170 - 185130U005	43
Grafico 140 - 185130U020	38	Grafico 171 - 2020240B999	43
Grafico 141 - 185130U021	38	Grafico 172 - 203010B001	43
Grafico 142 - 185130U022	38	Grafico 173 - 203010B999	43
Grafico 143 - 185130U023	38	Grafico 174 - 203010C001	43
Grafico 144 - 185130U024	38	Grafico 175 - 203010C002	44
Grafico 145 - 185130U503	39	Grafico 176 - 203010C003	44
Grafico 146 - 185130U504	39	Grafico 177 - 203010C004	44
Grafico 147 - 185130U505	39	Grafico 178 - 203010C005	44
Grafico 148 - 185130U506	39	Grafico 179 - 203010C006	44
Grafico 149 - 185130U507	39	Grafico 180 - 203010C007	44
Grafico 150 - 185130U508	39	Grafico 181 - 203010C008	45
Grafico 151 - 185130U509	40	Grafico 182 - 203010C009	45
Grafico 152 - 185130U510	40	Grafico 183 - 203010C010	45
Grafico 153 - 185130U511	40	Grafico 184 - 203010C011	45



Grafico 185 - 203010C012	45	Grafico 216 - 203010C042	50
Grafico 186 - 203010C013	45	Grafico 217 - 203010C043	51
Grafico 187 - 203010C014A	46	Grafico 218 - 203010C044	51
Grafico 188 - 203010C014B	46	Grafico 219 - 203010C045	51
Grafico 189 - 203010C015	46	Grafico 220 - 203010C046	51
Grafico 190 - 203010C016	46	Grafico 221 - 203010C047	51
Grafico 191 - 203010C017	46	Grafico 222 - 203010C048	51
Grafico 192 - 203010C018	46	Grafico 223 - 203010C049	52
Grafico 193 - 203010C019	47	Grafico 224 - 203010C050	52
Grafico 194 - 203010C020	47	Grafico 225 - 203010C051	52
Grafico 195 - 203010C021	47	Grafico 226 - 203010C052	52
Grafico 196 - 203010C022	47	Grafico 227 - 203010C053	52
Grafico 197 - 203010C023	47	Grafico 228 - 203010C054	52
Grafico 198 - 203010C024	47	Grafico 229 - 203010C055	53
Grafico 199 - 203010C025	48	Grafico 230 - 203010C056	53
Grafico 200 - 203010C026	48	Grafico 231 - 203010C057	53
Grafico 201 - 203010C027	48	Grafico 232 - 203010C058	53
Grafico 202 - 203010C028	48	Grafico 233 - 203010C059	53
Grafico 203 - 203010C029	48	Grafico 234 - 203010C060	53
Grafico 204 - 203010C030	48	Grafico 235 - 203010C061	54
Grafico 205 - 203010C031	49	Grafico 236 - 203010C062	54
Grafico 206 - 203010C032	49	Grafico 237 - 203010C063	54
Grafico 207 - 203010C033	49	Grafico 238 - 203010C064	54
Grafico 208 - 203010C034	49	Grafico 239 - 203010C065	54
Grafico 209 - 203010C035	49	Grafico 240 - 203010C066	54
Grafico 210 - 203010C036	49	Grafico 241 - 203010C067	55
Grafico 211 - 203010C037	50	Grafico 242 - 203010C068	55
Grafico 212 - 203010C038	50	Grafico 243 - 203010C069	55
Grafico 213 - 203010C039	50	Grafico 244 - 203010C070	55
Grafico 214 - 203010C040	50	Grafico 245 - 203010C071	55
Grafico 215 - 203010C041	50	Grafico 246 - 203010C072	55



Grafico 247 - 203010C073	56	Grafico 278 - 203010C113	61
Grafico 248 - 203010C074	56	Grafico 279 - 203010C114	61
Grafico 249 - 203010C075	56	Grafico 280 - 203010C115	61
Grafico 250 - 203010C076	56	Grafico 281 - 203010C116	61
Grafico 251 - 203010C077	56	Grafico 282 - 203010C117	61
Grafico 252 - 203010C078	56	Grafico 283 - 203010C118	62
Grafico 253 - 203010C079A	57	Grafico 284 - 203010C119	62
Grafico 254 - 203010C079B	57	Grafico 285 - 203010C120	62
Grafico 255 - 203010C079C	57	Grafico 286 - 203010C121	62
Grafico 256 - 203010C079D	57	Grafico 287 - 203010C122	62
Grafico 257 - 203010C080	57	Grafico 288 - 203010C123	62
Grafico 258 - 203010C081	57	Grafico 289 - 203010C124	63
Grafico 259 - 203010C082	58	Grafico 290 - 203010C125	63
Grafico 260 - 203010C083	58	Grafico 291 - 203010C126	63
Grafico 261 - 203010C084	58	Grafico 292 - 203010C127	63
Grafico 262 - 203010C085	58	Grafico 293 - 203010C128	63
Grafico 263 - 203010C086	58	Grafico 294 - 203010C129	63
Grafico 264 - 203010C087	58	Grafico 295 - 203010C130	64
Grafico 265 - 203010C094	59	Grafico 296 - 203010C131	64
Grafico 266 - 203010C101	59	Grafico 297 - 203010C132	64
Grafico 267 - 203010C102	59	Grafico 298 - 203010C133	64
Grafico 268 - 203010C103	59	Grafico 299 - 203010C134	64
Grafico 269 - 203010C104	59	Grafico 300 - 203010C135	64
Grafico 270 - 203010C105	59	Grafico 301 - 203010C136	65
Grafico 271 - 203010C106	60	Grafico 302 - 203010C137	65
Grafico 272 - 203010C107	60	Grafico 303 - 203010C138	65
Grafico 273 - 203010C108	60	Grafico 304 - 203010C139	65
Grafico 274 - 203010C109	60	Grafico 305 - 203010C140	65
Grafico 275 - 203010C110	60	Grafico 306 - 203010C141	65
Grafico 276 - 203010C111	60	Grafico 307 - 203010C142	66
Grafico 277 - 203010C112	61	Grafico 308 - 203010C143	66



Grafico 309 - 203010C144	66	Grafico 340 - 203010C169	71
Grafico 310 - 203010C145	66	Grafico 341 - 203010C170	71
Grafico 311 - 203010C146	66	Grafico 342 - 203010C171	71
Grafico 312 - 203010C147	66	Grafico 343 - 203010C172	72
Grafico 313 - 203010C148	67	Grafico 344 - 203010C173	72
Grafico 314 - 203010C149	67	Grafico 345 - 203010C174	72
Grafico 315 - 203010C150	67	Grafico 346 - 203010C175	72
Grafico 316 - 203010C151	67	Grafico 347 - 203010C176	72
Grafico 317 - 203010C152	67	Grafico 348 - 203010C177	72
Grafico 318 - 203010C153	67	Grafico 349 - 203010C178	73
Grafico 319 - 203010C154	68	Grafico 350 - 203010C179	73
Grafico 320 - 203010C155	68	Grafico 351 - 203010C180	73
Grafico 321 - 203010C156	68	Grafico 352 - 203010C181	73
Grafico 322 - 203010C157A	68	Grafico 353 - 203010C182	73
Grafico 323 - 203010C157B	68	Grafico 354 - 203010C183	73
Grafico 324 - 203010C158A	68	Grafico 355 - 203010C184	74
Grafico 325 - 203010C158B	69	Grafico 356 - 203010C185	74
Grafico 326 - 203010C159	69	Grafico 357 - 203010C186	74
Grafico 327 - 203010C160A	69	Grafico 358 - 203010C187	74
Grafico 328 - 203010C160B	69	Grafico 359 - 203010C188	74
Grafico 329 - 203010C161A	69	Grafico 360 - 203010C189	74
Grafico 330 - 203010C161B	69	Grafico 361 - 203010C190	75
Grafico 331 - 203010C162	70	Grafico 362 - 203010C191	75
Grafico 332 - 203010C163A	70	Grafico 363 - 203010C192	75
Grafico 333 - 203010C163B	70	Grafico 364 - 203010C193	75
Grafico 334 - 203010C164A	70	Grafico 365 - 203010C194	75
Grafico 335 - 203010C164B	70	Grafico 366 - 203010C195	75
Grafico 336 - 203010C165	70	Grafico 367 - 203010C196	76
Grafico 337 - 203010C166	71	Grafico 368 - 203010C197	76
Grafico 338 - 203010C167	71	Grafico 369 - 203010C198	76
Grafico 339 - 203010C168	71	Grafico 370 - 203010C199	76





Grafico 371 - 203010C200	76	Grafico 402 - 203010C235	81
Grafico 372 - 203010C201	76	Grafico 403 - 203010C236	82
Grafico 373 - 203010C202	77	Grafico 404 - 203010C237	82
Grafico 374 - 203010C203	77	Grafico 405 - 203010C238	82
Grafico 375 - 203010C204	77	Grafico 406 - 203010C239	82
Grafico 376 - 203010C205	77	Grafico 407 - 203010C240	82
Grafico 377 - 203010C206	77	Grafico 408 - 203010C241	82
Grafico 378 - 203010C207	77	Grafico 409 - 203010C242	83
Grafico 379 - 203010C208	78	Grafico 410 - 203010C243	83
Grafico 380 - 203010C209	78	Grafico 411 - 203010C244	83
Grafico 381 - 203010C210	78	Grafico 412 - 203010U001	83
Grafico 382 - 203010C211	78	Grafico 413 - 203010U002	83
Grafico 383 - 203010C212	78	Grafico 414 - 203010U005	83
Grafico 384 - 203010C213	78	Grafico 415 - 203010U006	84
Grafico 385 - 203010C214	79	Grafico 416 - 203010U007	84
Grafico 386 - 203010C215	79	Grafico 417 - 203010U008	84
Grafico 387 - 203010C216	79	Grafico 418 - 203010U009	84
Grafico 388 - 203010C217	79	Grafico 419 - 203010U010	84
Grafico 389 - 203010C222	79	Grafico 420 - 203010U011	84
Grafico 390 - 203010C223	79	Grafico 421 - 203010U012	85
Grafico 391 - 203010C224	80	Grafico 422 - 203010U013	85
Grafico 392 - 203010C225	80	Grafico 423 - 203010U014	85
Grafico 393 - 203010C226	80	Grafico 424 - 203010U501	85
Grafico 394 - 203010C227	80	Grafico 425 - 203010U502	85
Grafico 395 - 203010C228	80	Grafico 426 - 203010U504	85
Grafico 396 - 203010C229	80	Grafico 427 - 203010U505	86
Grafico 397 - 203010C230	81	Grafico 428 - 203010U508	86
Grafico 398 - 203010C231	81	Grafico 429 - 203010U509	86
Grafico 399 - 203010C232	81	Grafico 430 - 203010U993	86
Grafico 400 - 203010C233	81	Grafico 431 - 203020C063	86
Grafico 401 - 203010C234	81	Grafico 432 - 203020C064	86

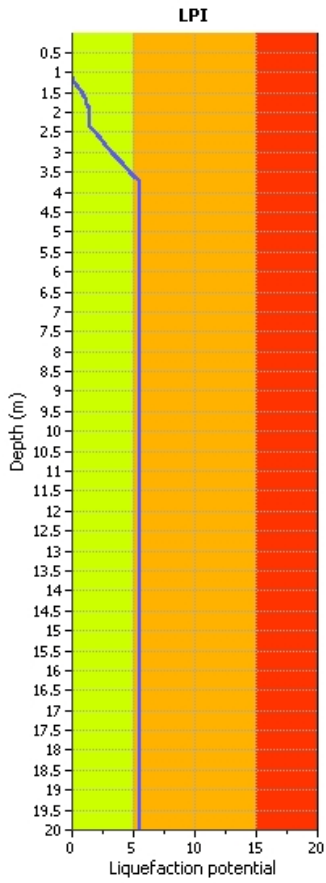




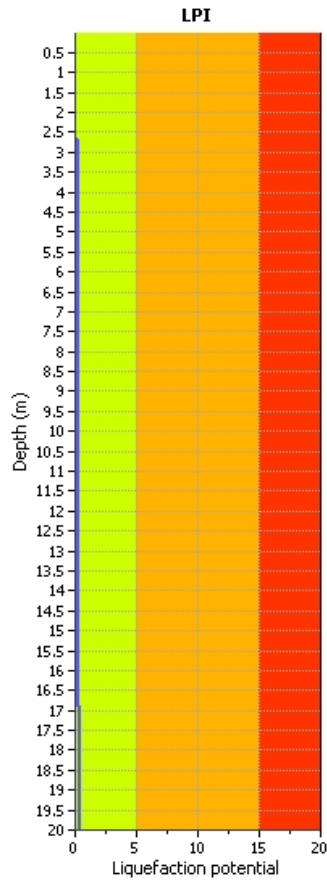
Grafico 433 - 203020U095	87	Grafico 438 - 185130U999	87
Grafico 434 - 203020U096	87	Grafico 439 - 203010U991	88
Grafico 435 - 203020U097	87	Grafico 440 - 203010U992	88
Grafico 436 - 203020U098	87		
Grafico 437 - 203020U099	87		



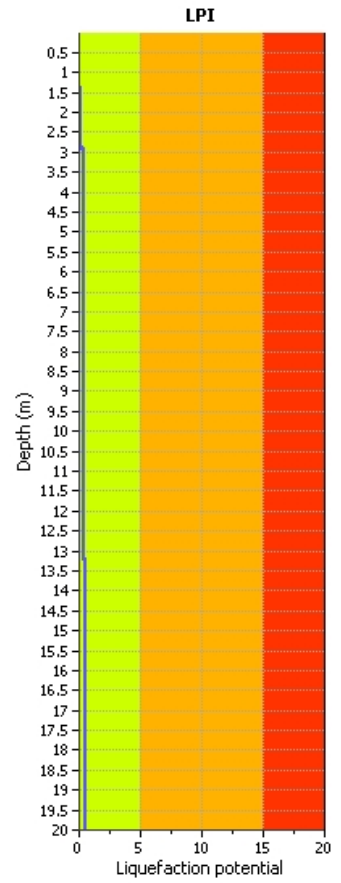
# **Grafici dell'indice $I_L$**



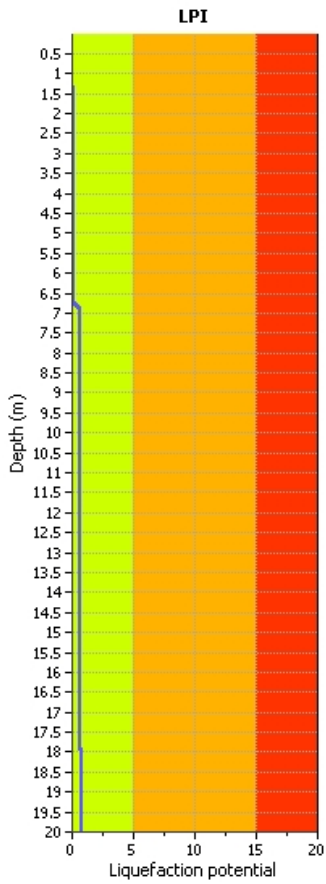
**Grafico 1 - 185130B002**



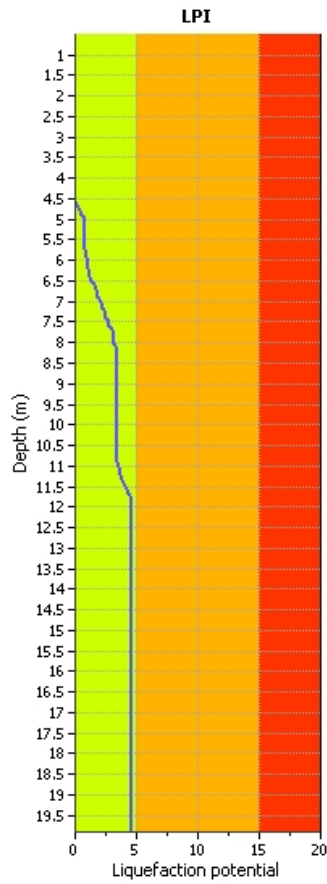
**Grafico 2 - 185130B003**



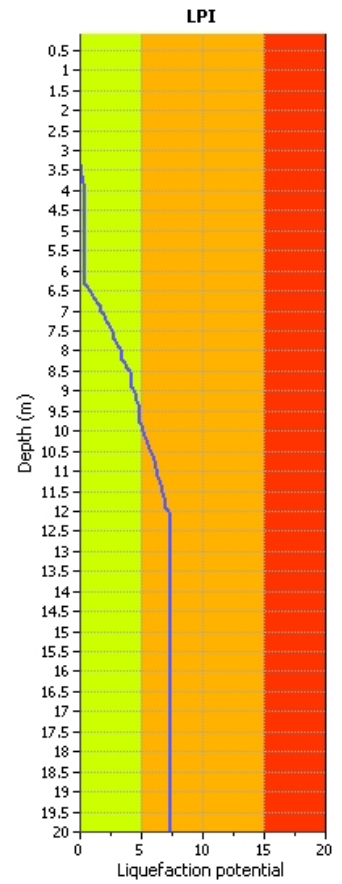
**Grafico 3 - 185130B004**



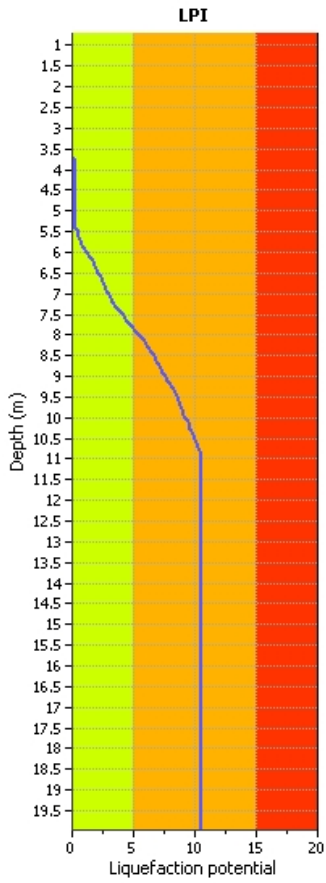
**Grafico 4 - 185130B005**



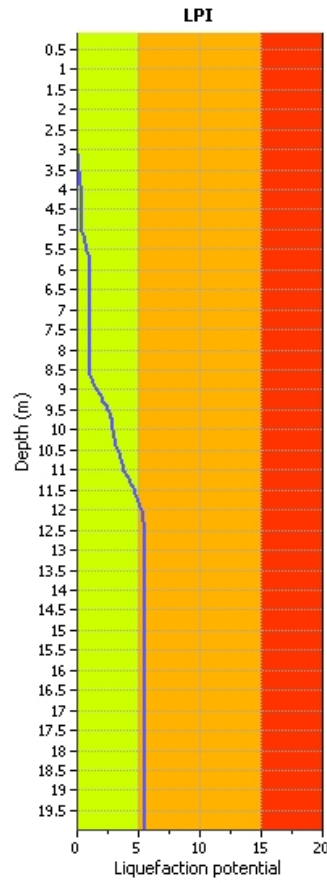
**Grafico 5 - 185130B501**



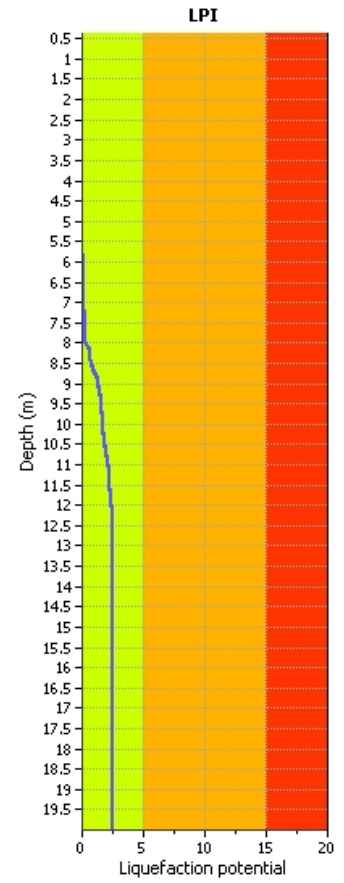
**Grafico 6 - 185130B502**



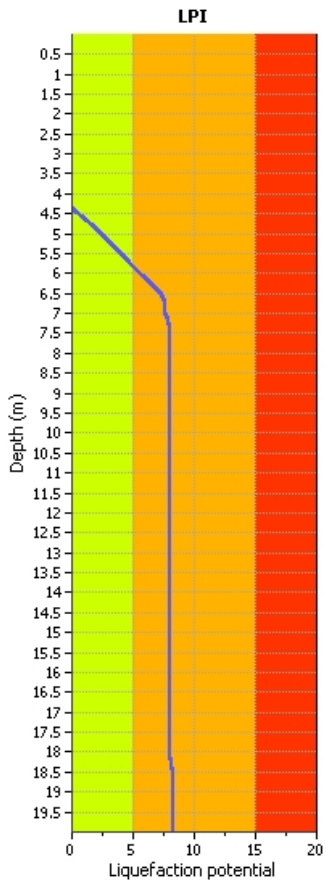
**Grafico 7 - 185130B503**



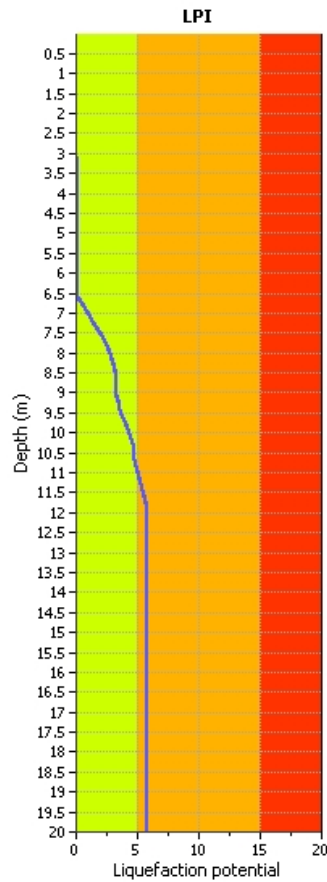
**Grafico 8 - 185130B504**



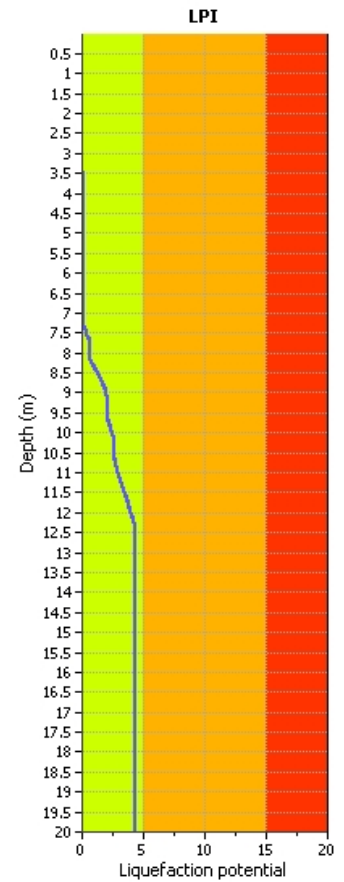
**Grafico 9 - 185130B995**



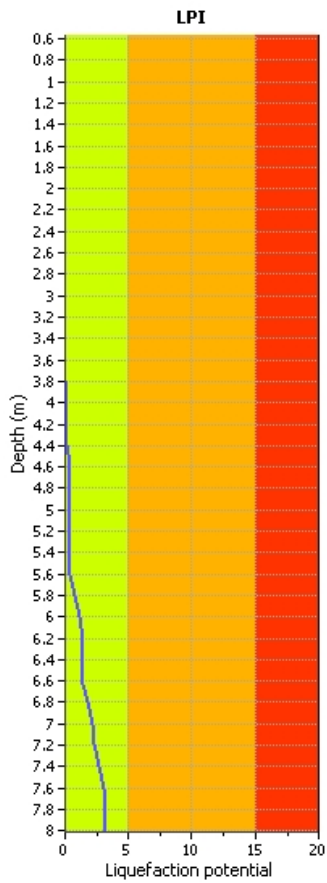
**Grafico 10 - 185130B996**



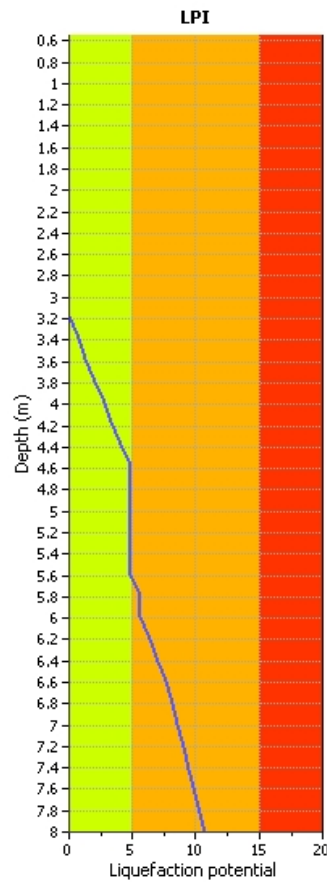
**Grafico 11 - 185130B998**



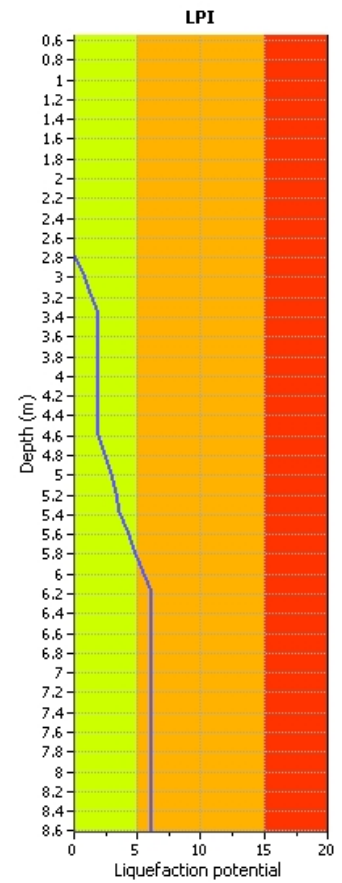
**Grafico 12 - 185130B999**



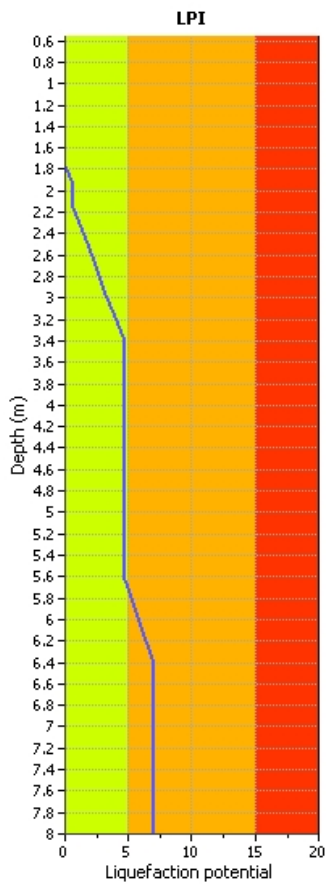
**Grafico 13 - 185130C001**



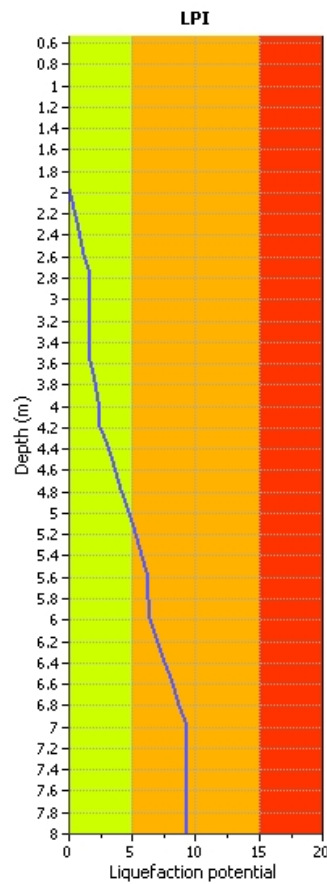
**Grafico 14 - 185130C002**



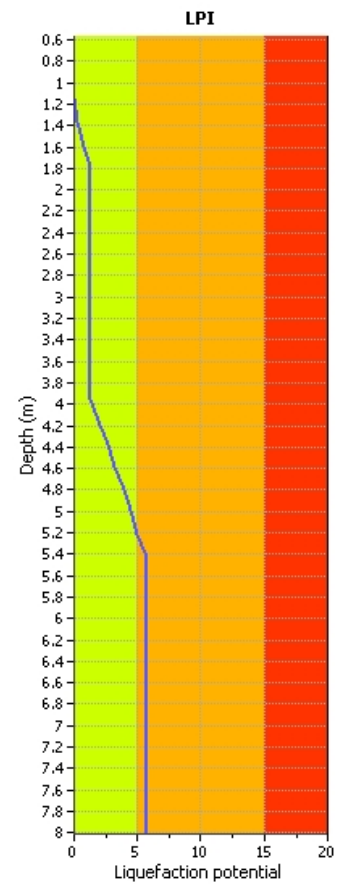
**Grafico 15 - 185130C003**



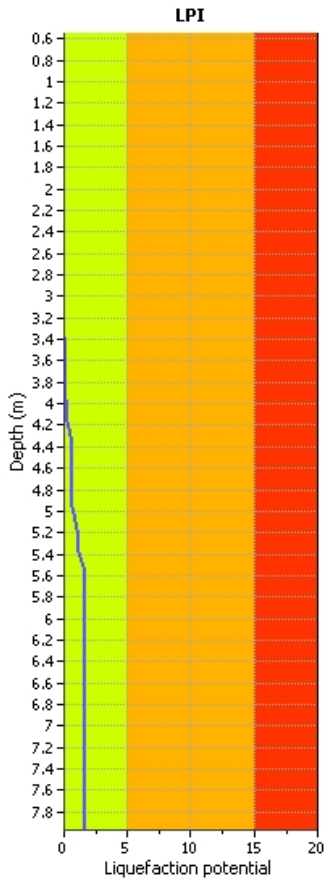
**Grafico 16 - 185130C004**



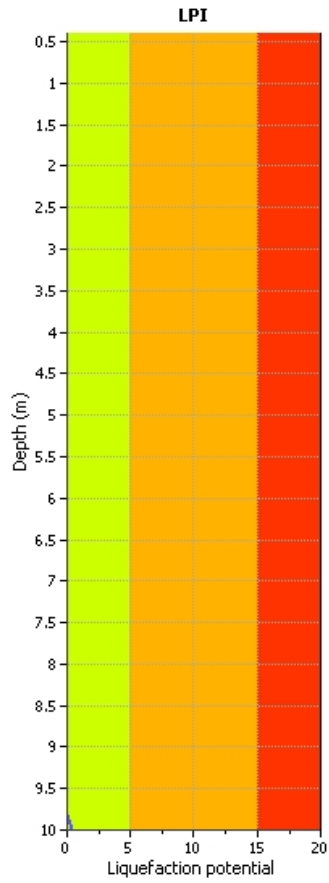
**Grafico 17 - 185130C005**



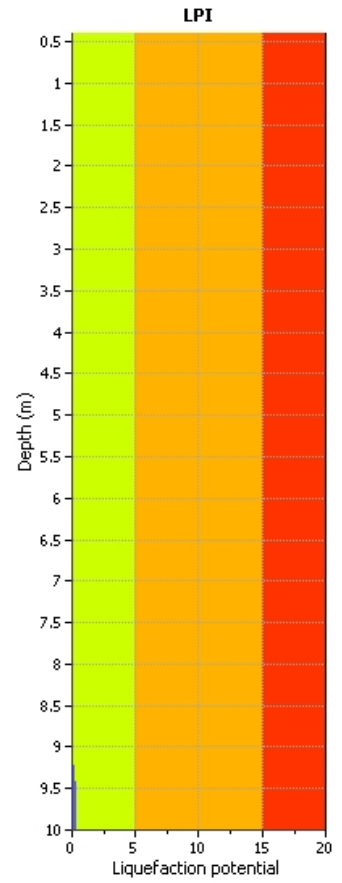
**Grafico 18 - 185130C006**



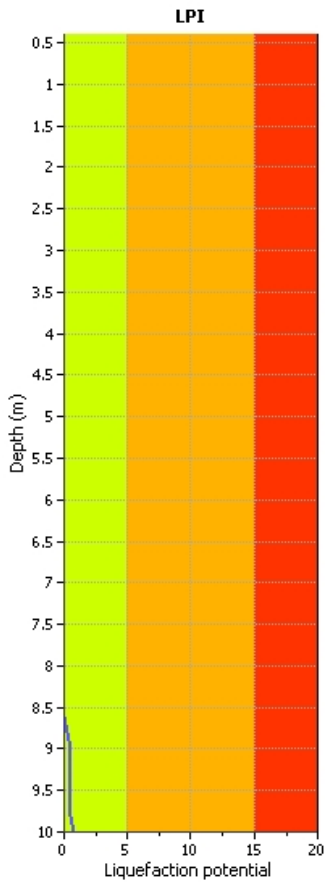
**Grafico 19 - 185130C007**



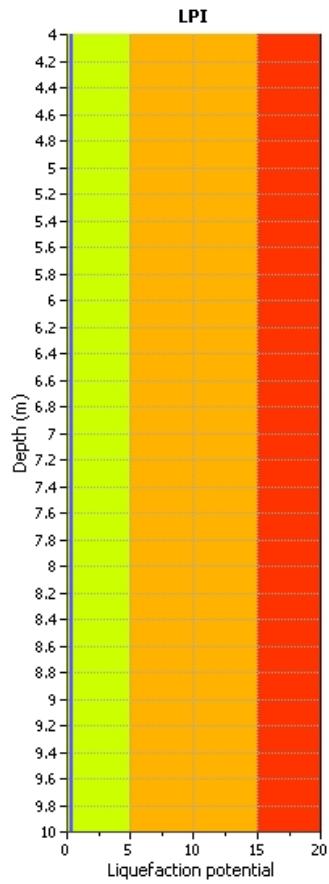
**Grafico 20 - 185130C008**



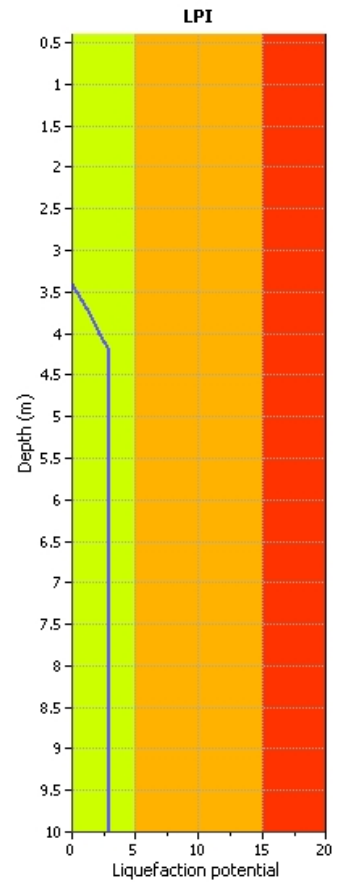
**Grafico 21 - 185130C009**



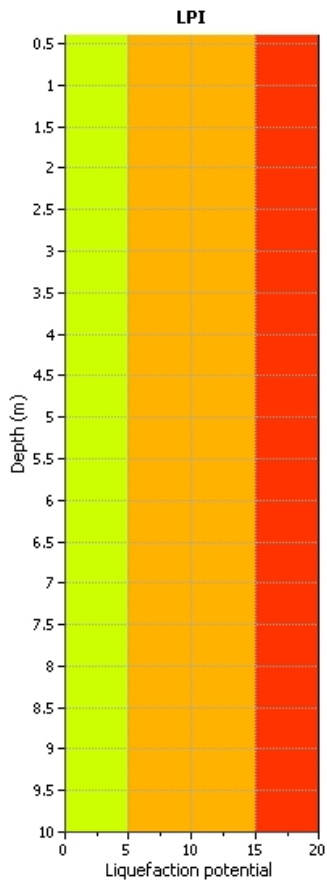
**Grafico 22 - 185130C010**



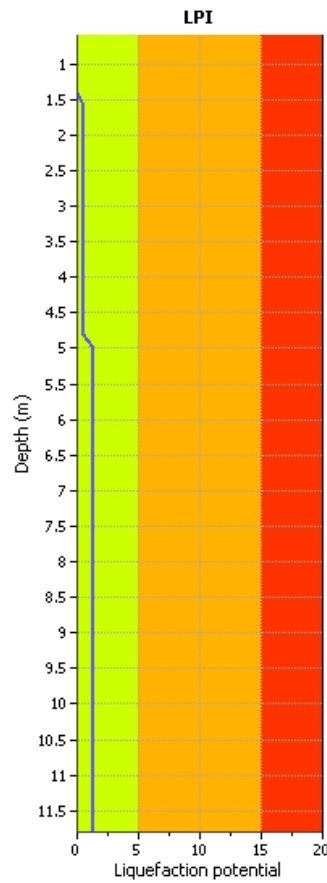
**Grafico 23 - 185130C011**



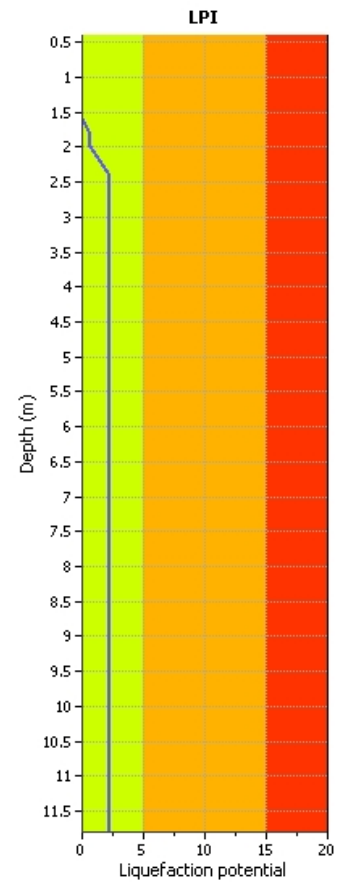
**Grafico 24 - 185130C012**



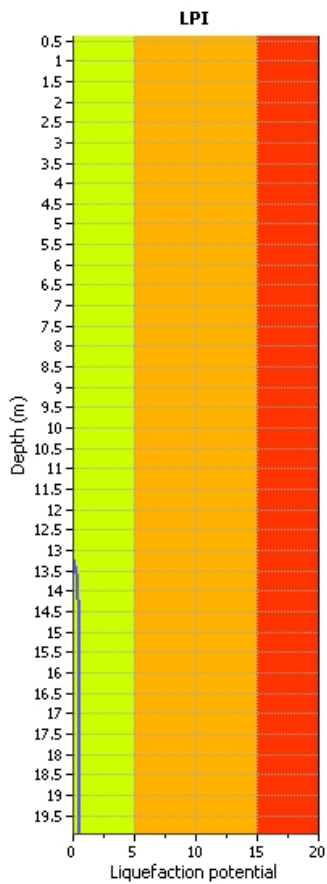
**Grafico 25 - 185130C013**



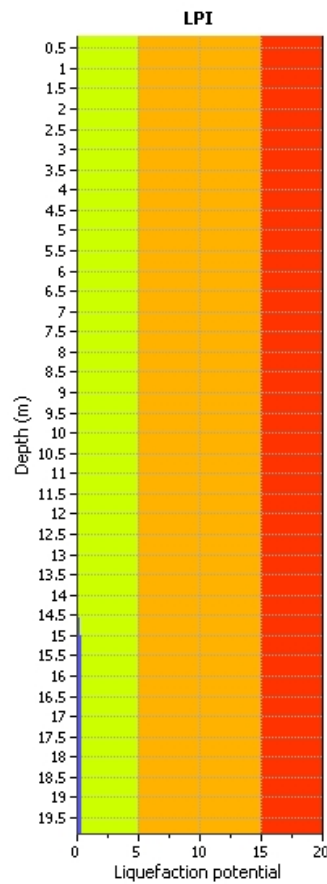
**Grafico 26 - 185130C014**



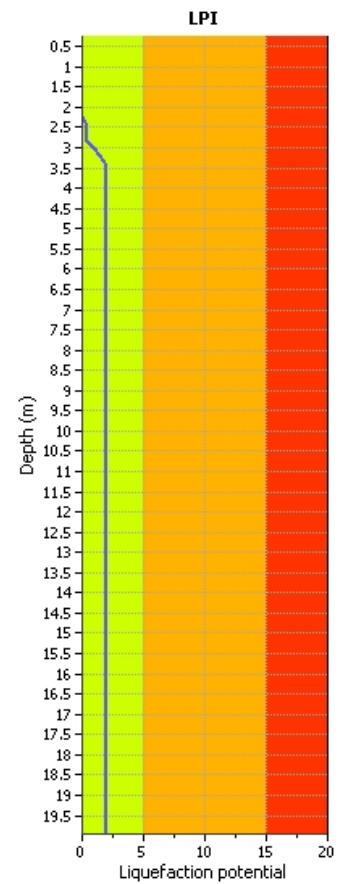
**Grafico 27 - 185130C015**



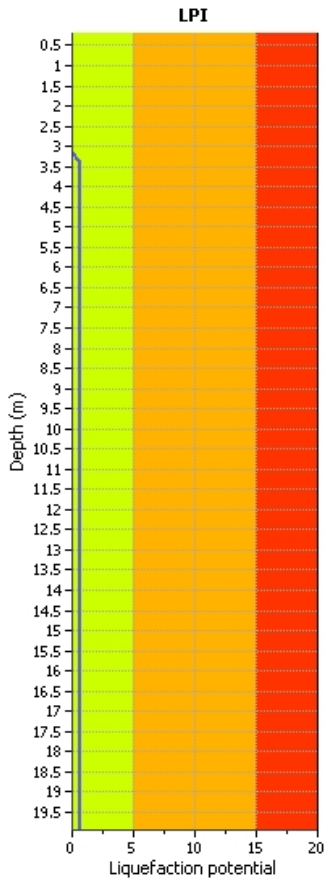
**Grafico 28 - 185130C033**



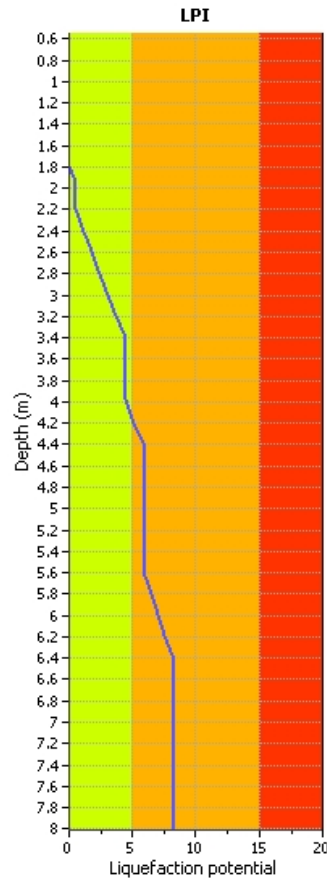
**Grafico 29 - 185130C034**



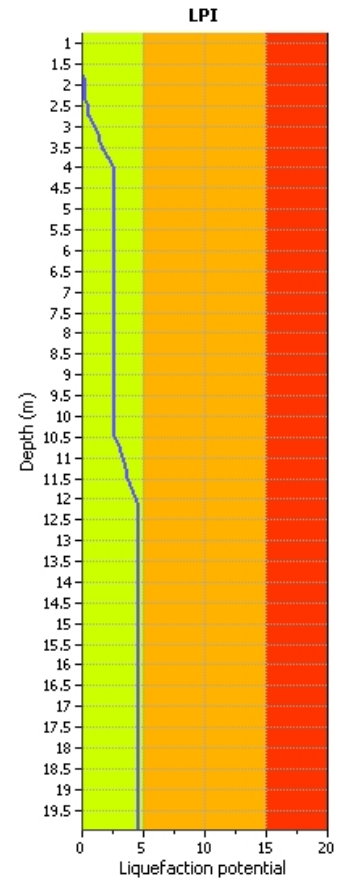
**Grafico 30 - 185130C035**



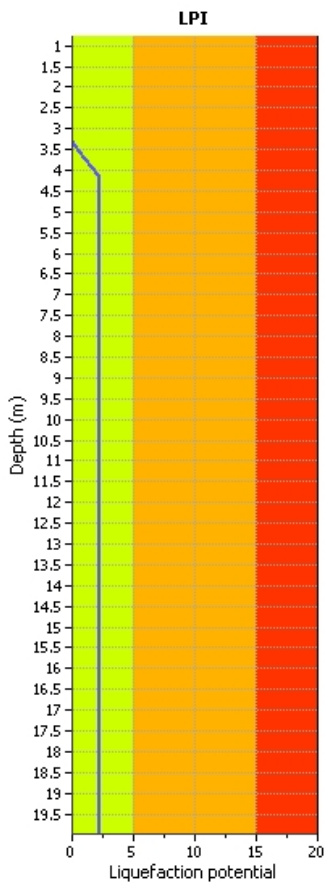
**Grafico 31 - 185130C036**



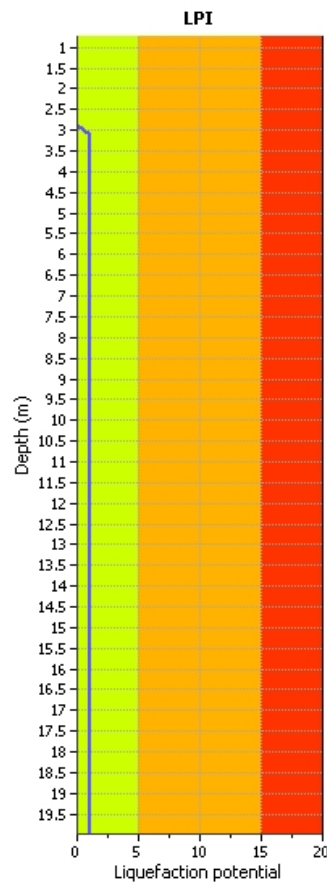
**Grafico 32 - 185130C041**



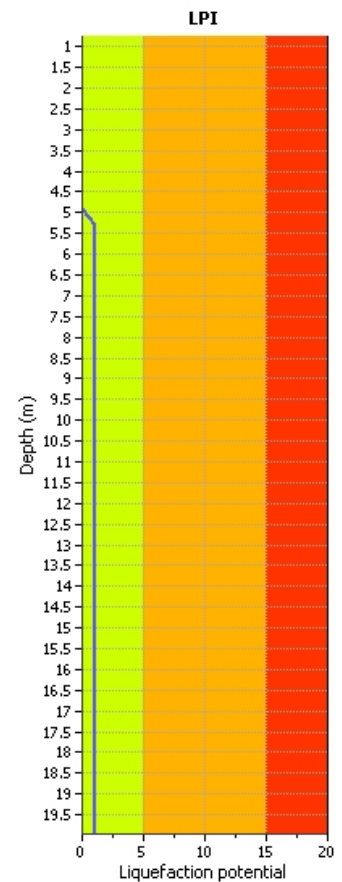
**Grafico 33 - 185130C043**



**Grafico 34 - 185130C046**

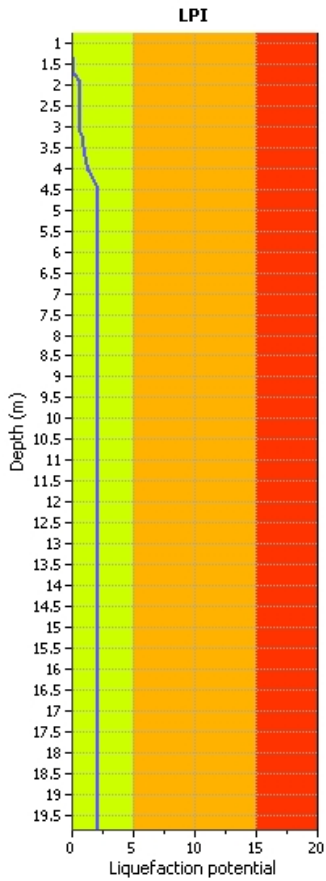


**Grafico 35 - 185130C047**

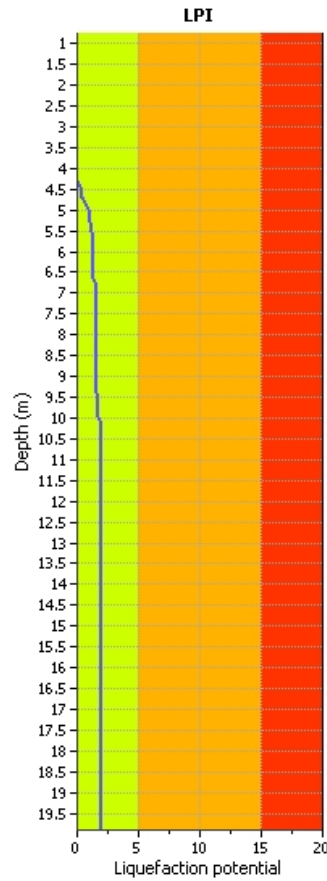


**Grafico 36 - 185130C048**

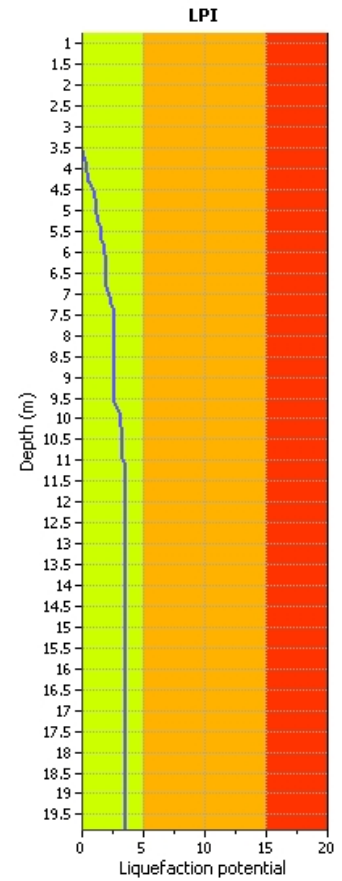




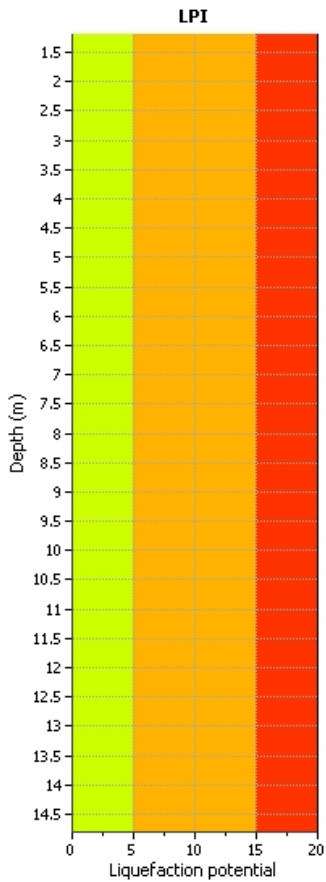
**Grafico 37 - 185130C049**



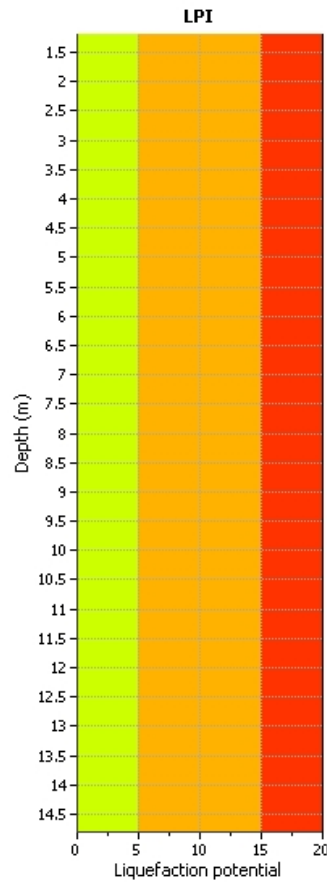
**Grafico 38 - 185130C050**



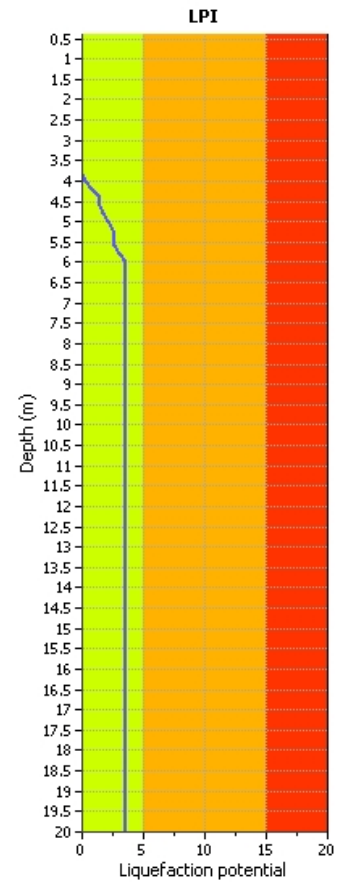
**Grafico 39 - 185130C051**



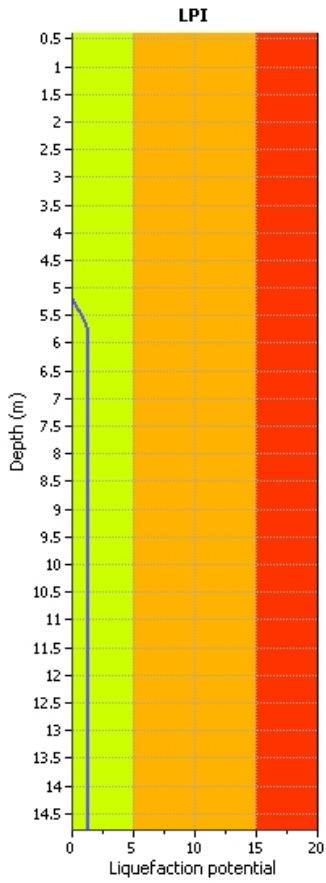
**Grafico 40 - 185130C127**



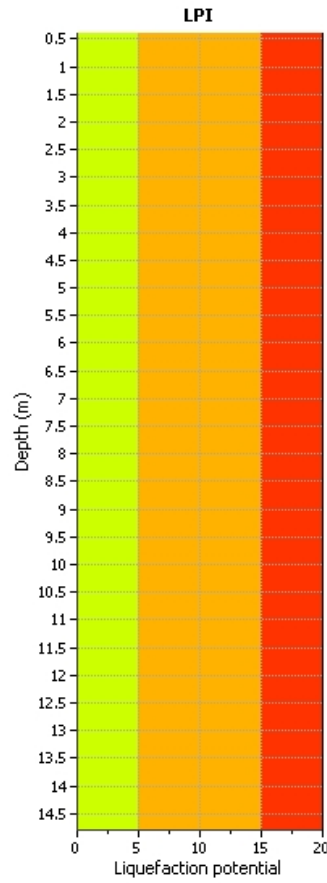
**Grafico 41 - 185130C128**



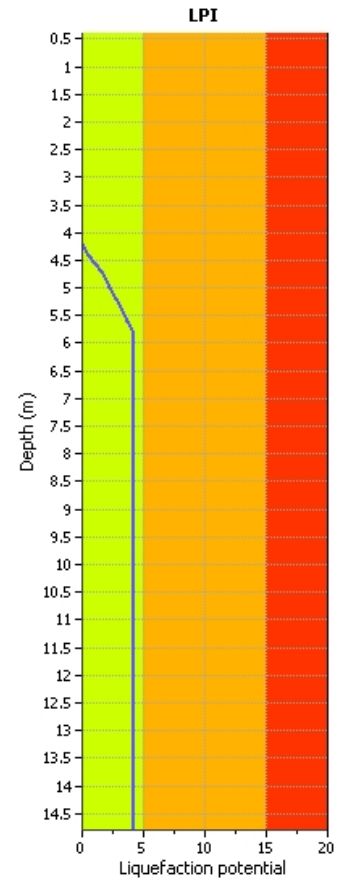
**Grafico 42 - 185130C130**



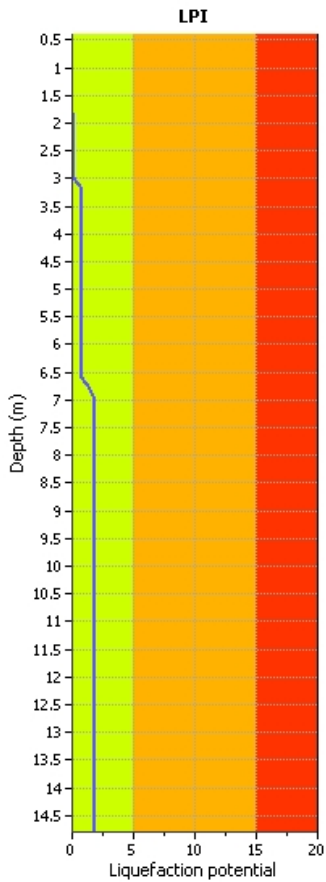
**Grafico 43 - 185130C131**



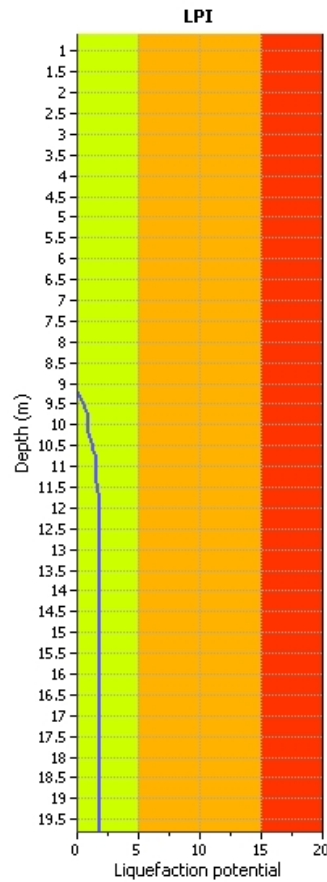
**Grafico 44 - 185130C132**



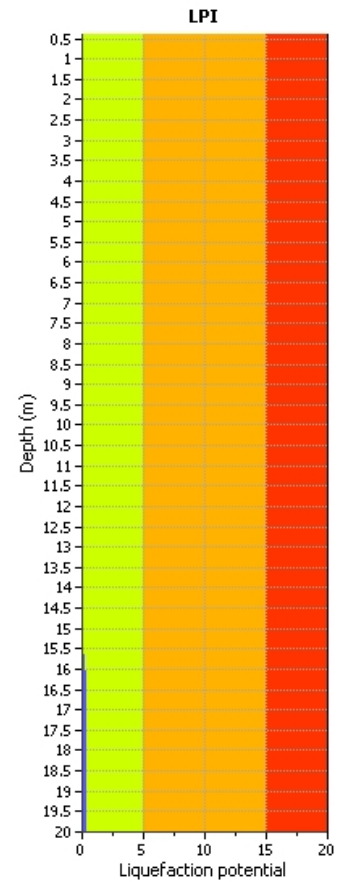
**Grafico 45 - 185130C133**



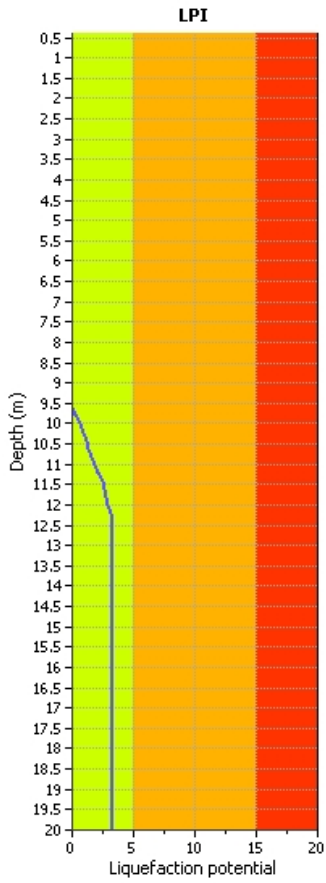
**Grafico 46 - 185130C134**



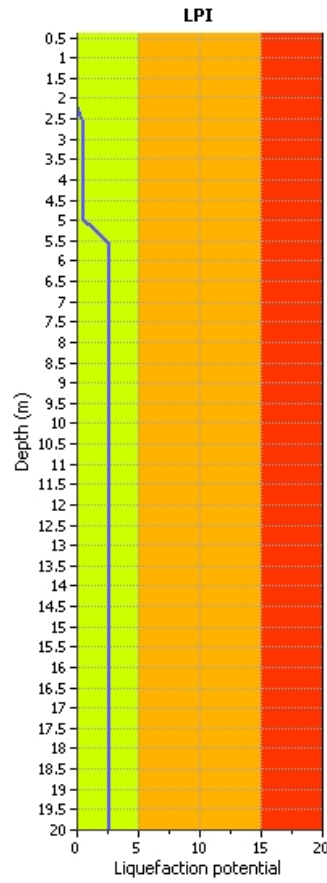
**Grafico 47 - 185130C135**



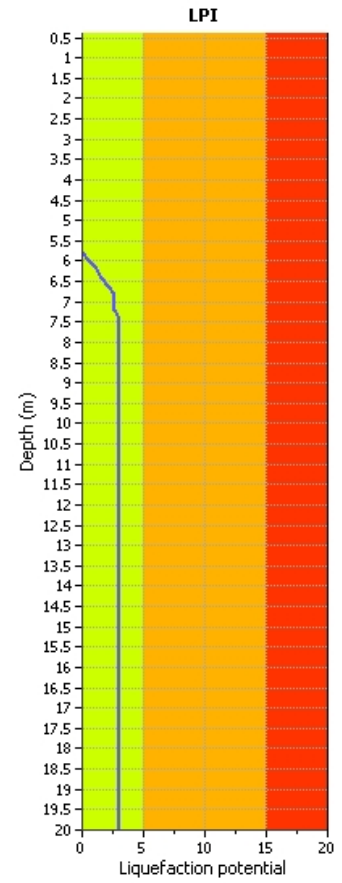
**Grafico 48 - 185130C136**



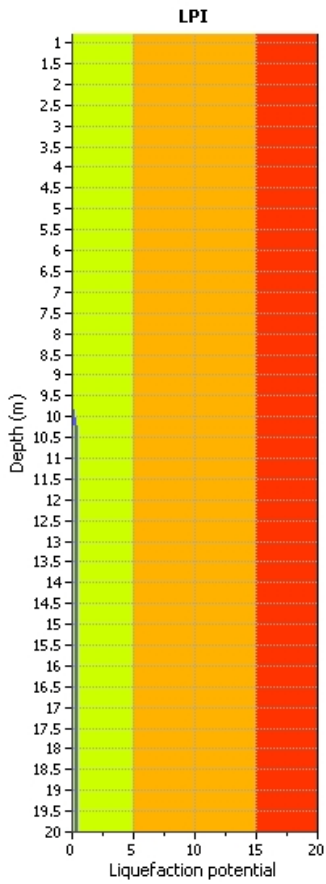
**Grafico 49 - 185130C137**



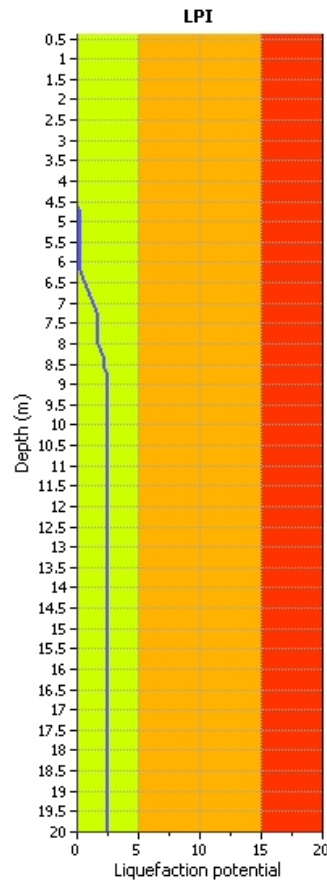
**Grafico 50 - 185130C138A**



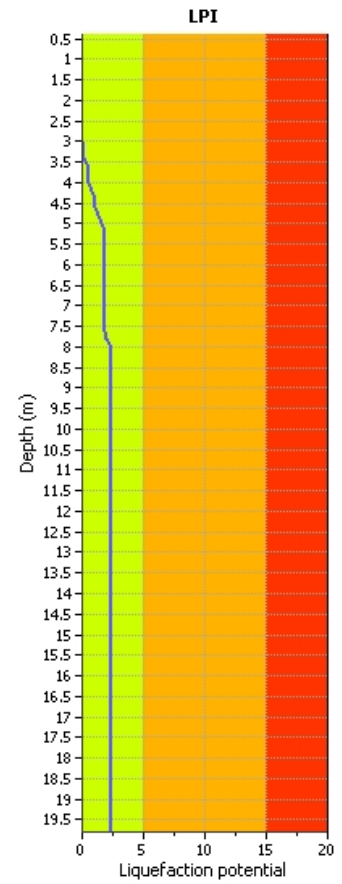
**Grafico 51 - 185130C138B**



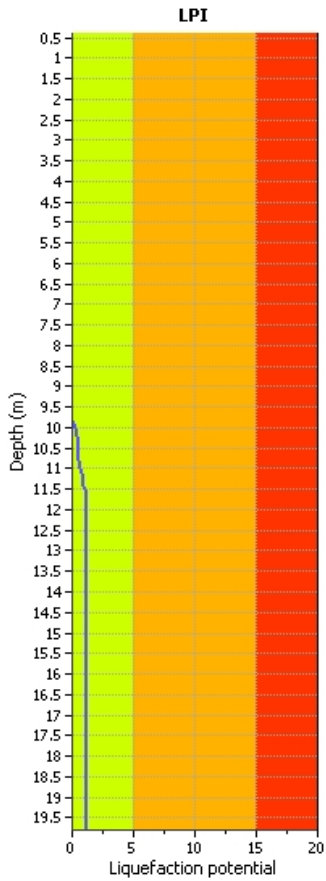
**Grafico 52 - 185130C139**



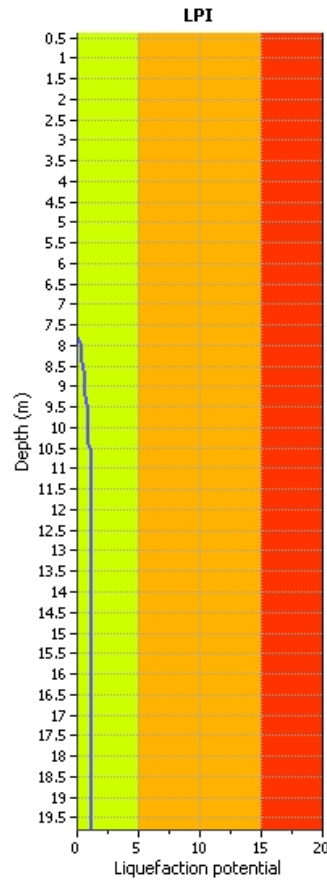
**Grafico 53 - 185130C140A**



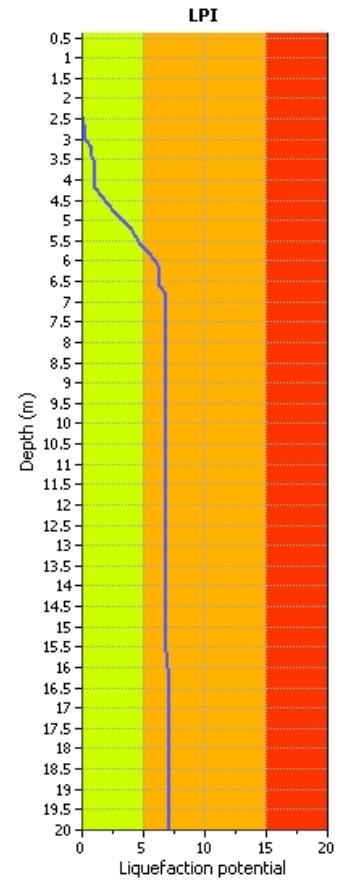
**Grafico 54 - 185130C140B**



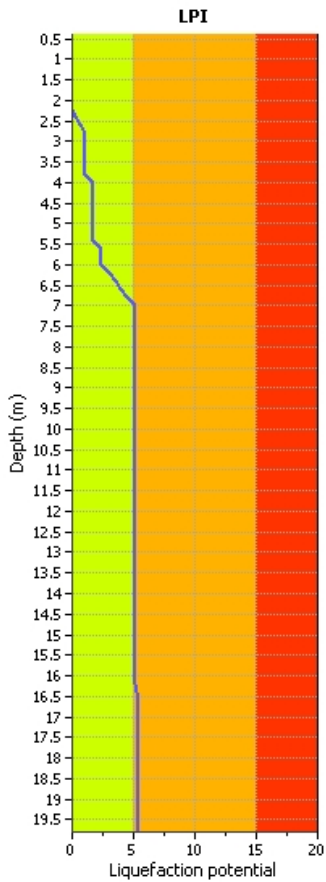
**Grafico 55 - 185130C140C**



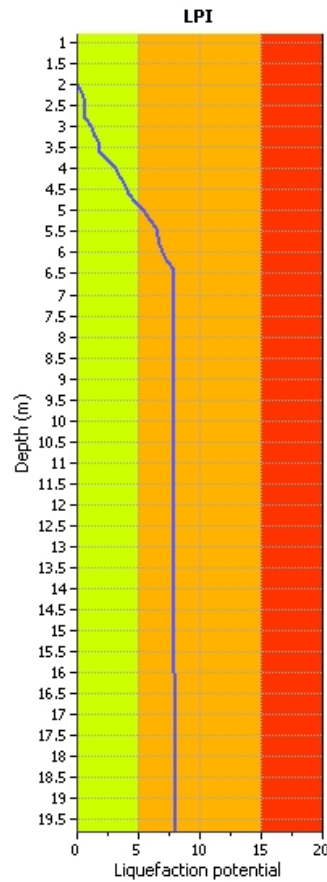
**Grafico 56 - 185130C140D**



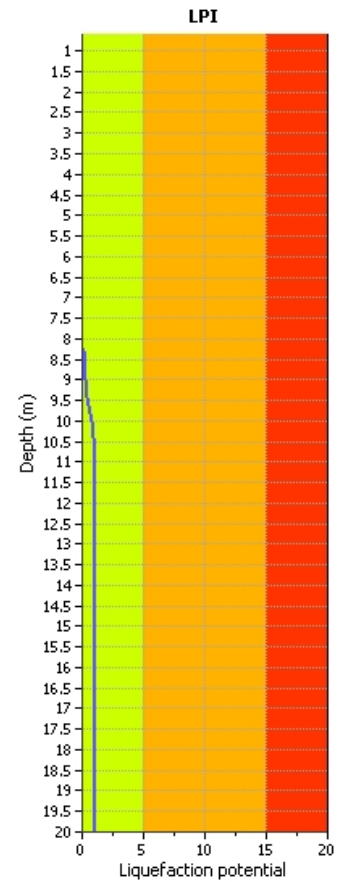
**Grafico 57 - 185130C141A**



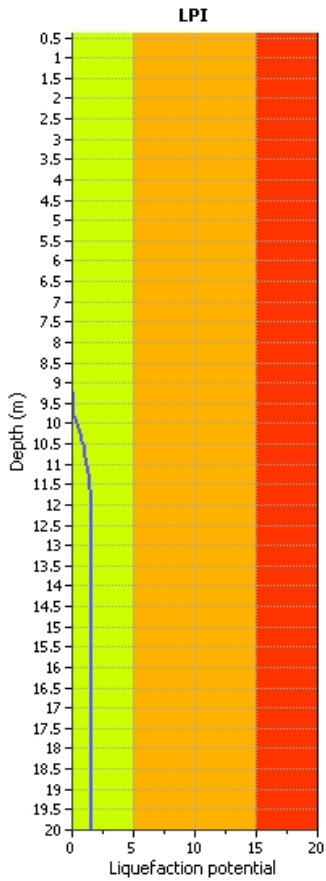
**Grafico 58 - 18130C141B**



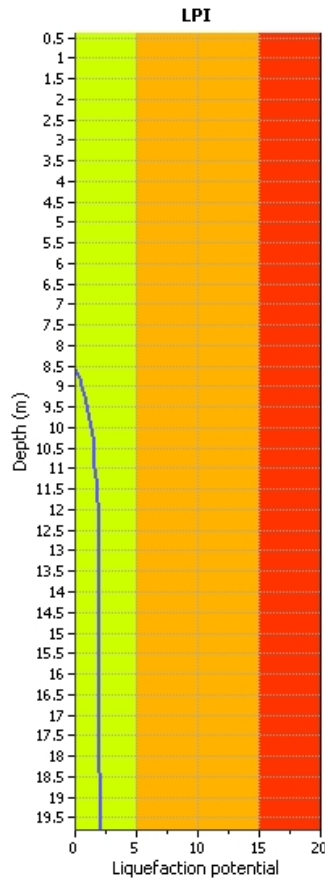
**Grafico 59 - 185130C141C**



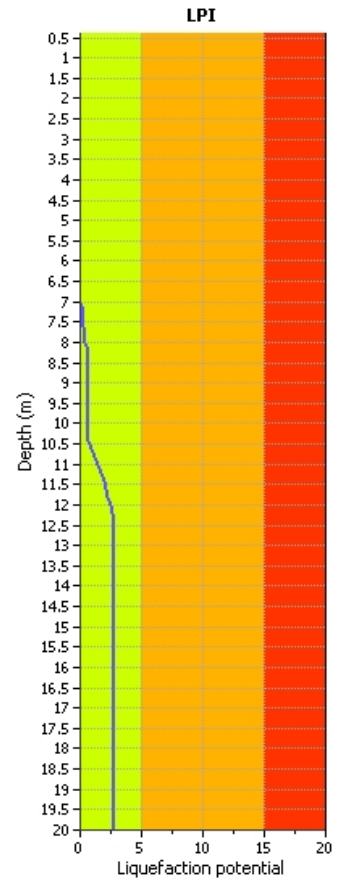
**Grafico 60 - 185130C142**



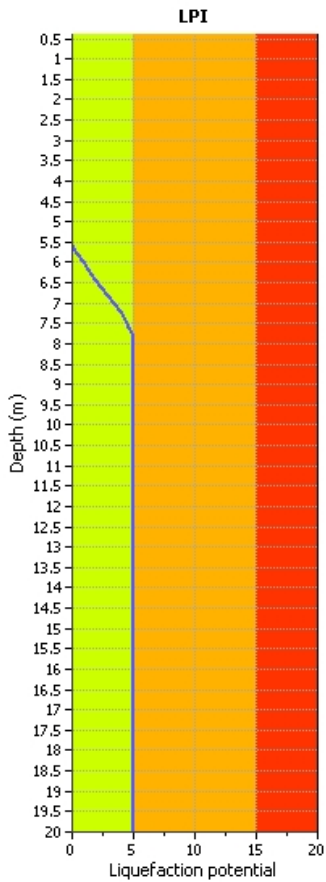
**Grafico 61 - 185130C143A**



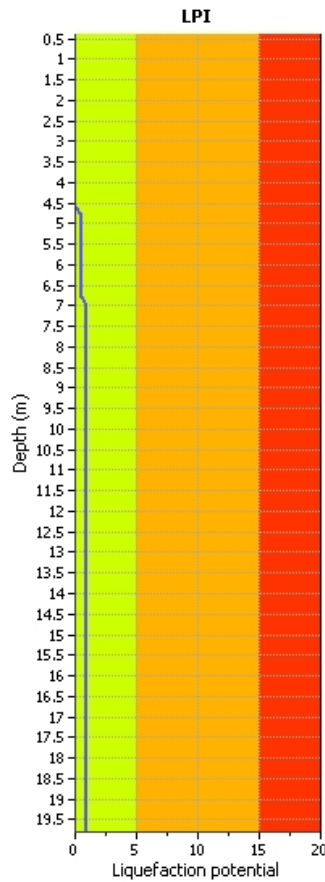
**Grafico 62 - 185130C143B**



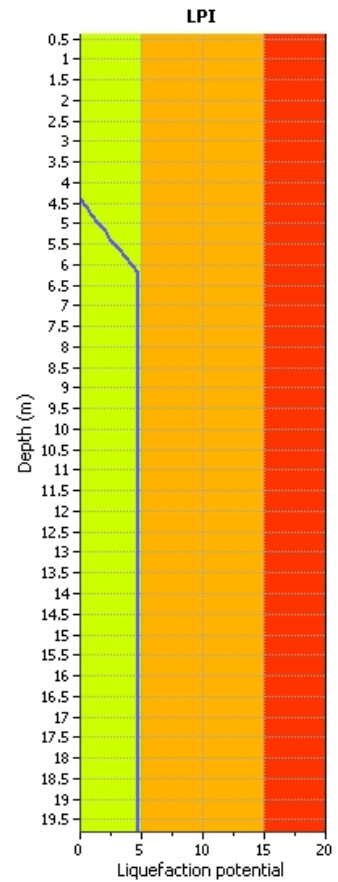
**Grafico 63 - 185130C144**



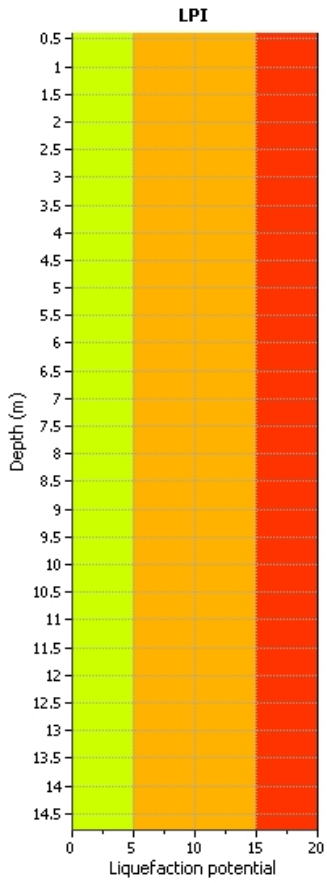
**Grafico 64 - 185130C145A**



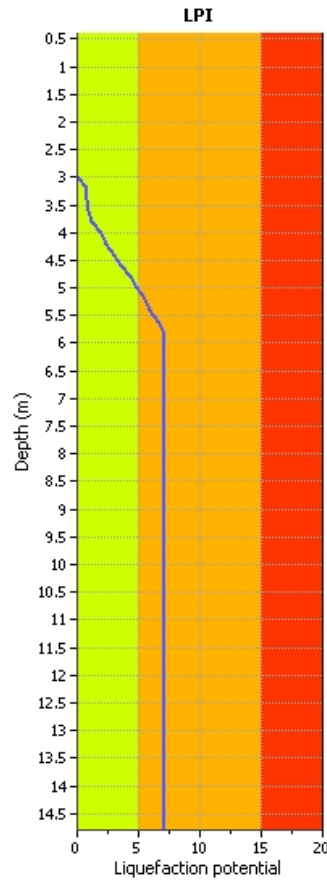
**Grafico 65 - 185130C145B**



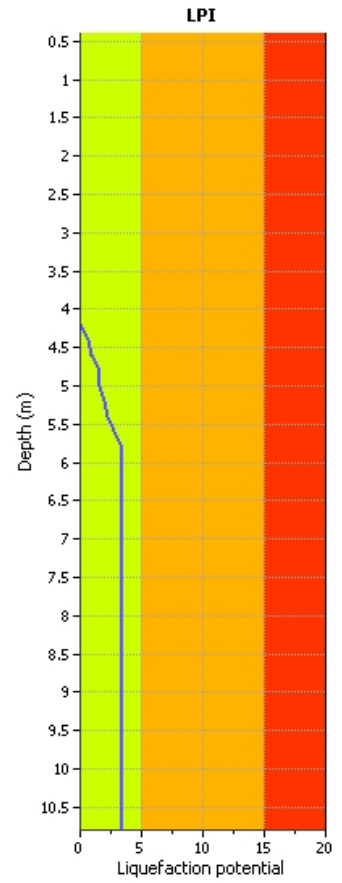
**Grafico 66 - 185130C145C**



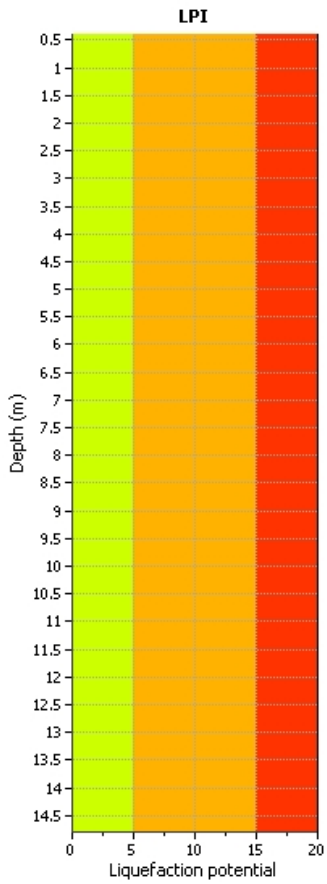
**Grafico 67 - 185130C155**



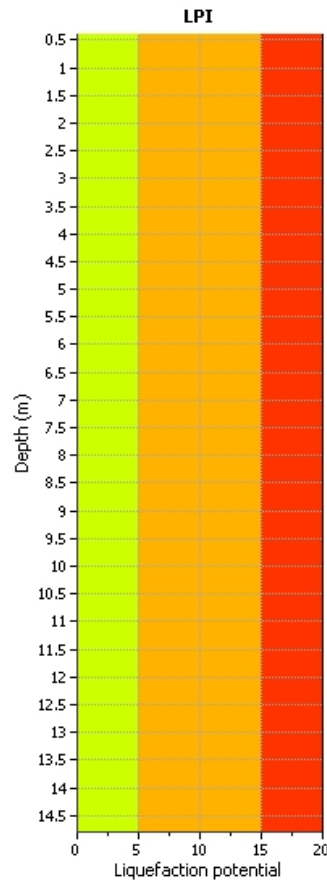
**Grafico 68 - 185130C156**



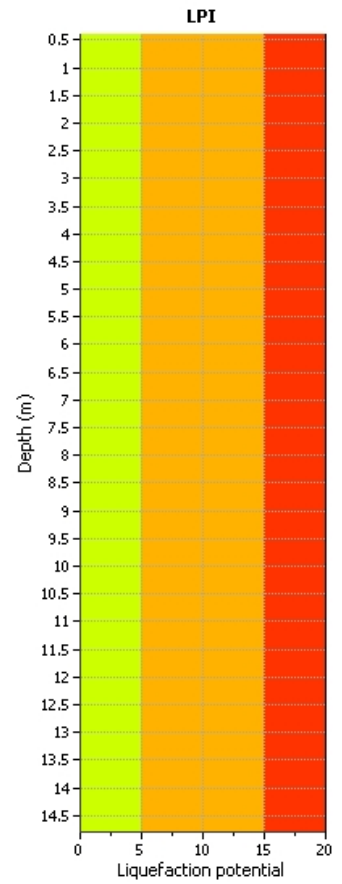
**Grafico 69 - 185130C157**



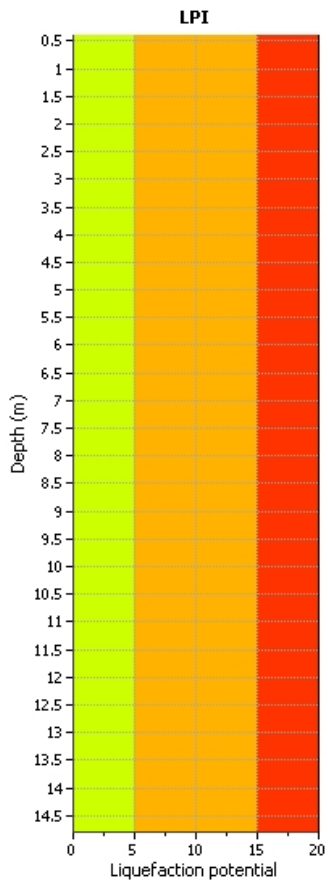
**Grafico 70 - 185130C158**



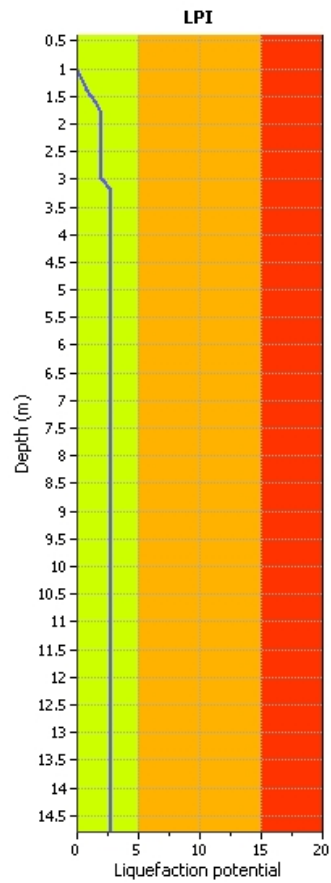
**Grafico 71 - 185130C159**



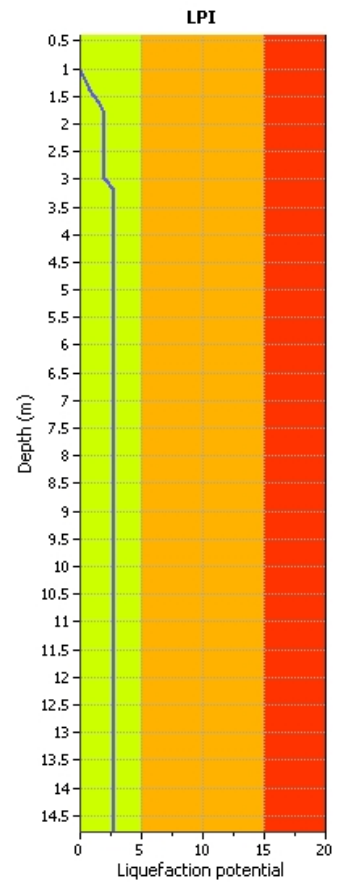
**Grafico 72 - 185130C160**



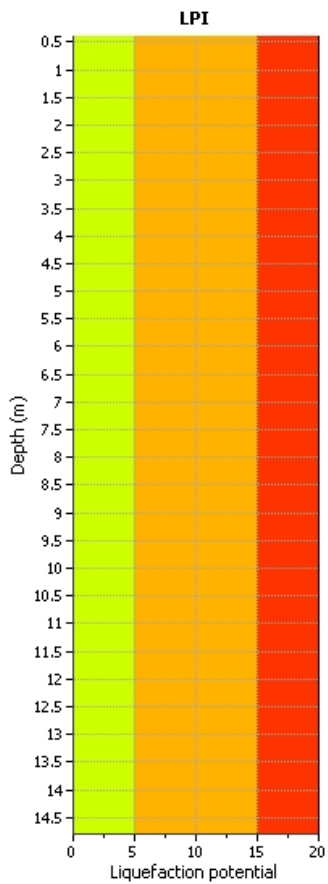
**Grafico 73 - 185130C161**



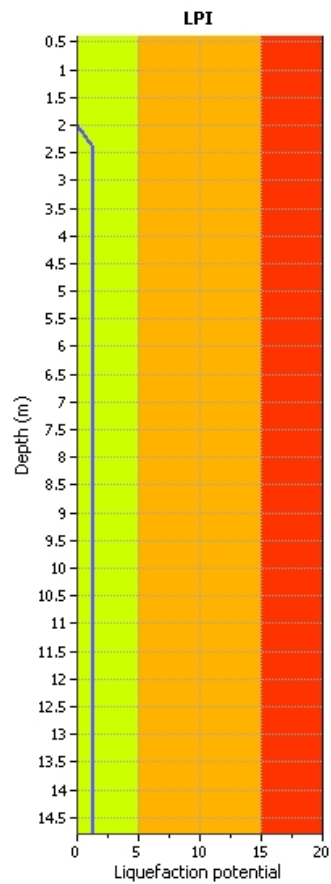
**Grafico 74 - 185130C162**



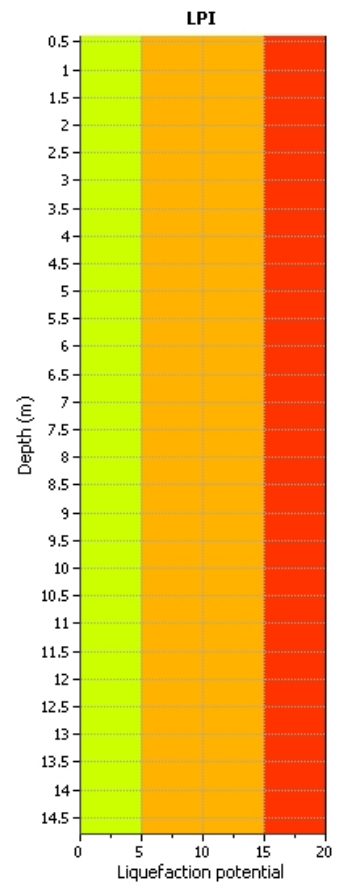
**Grafico 75 - 185130C163**



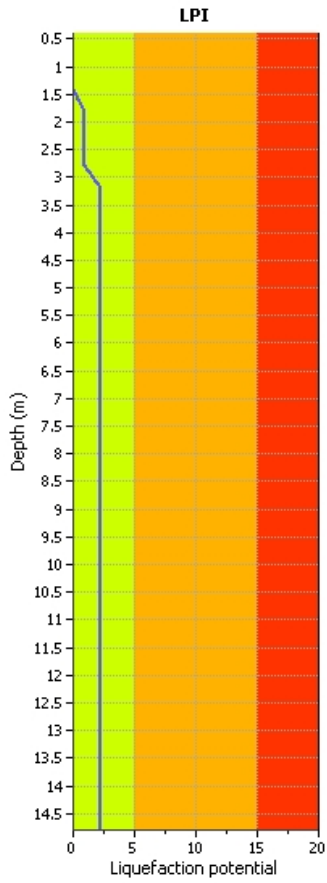
**Grafico 76 - 185130C164**



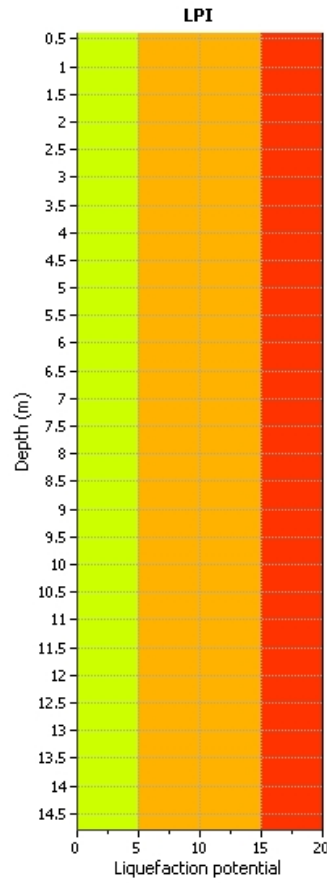
**Grafico 77 - 185130C165**



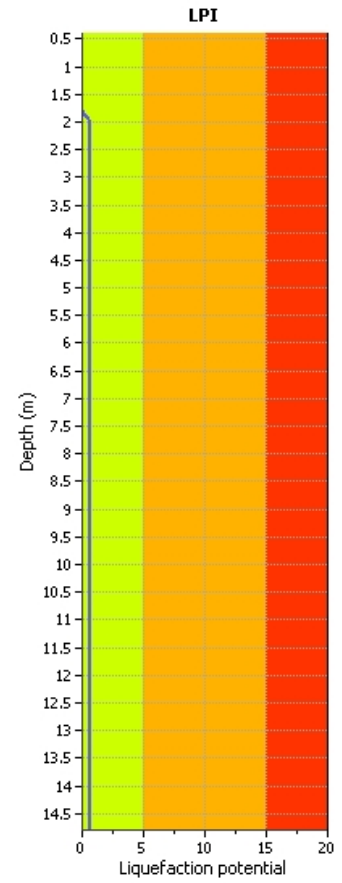
**Grafico 78 - 185130C166**



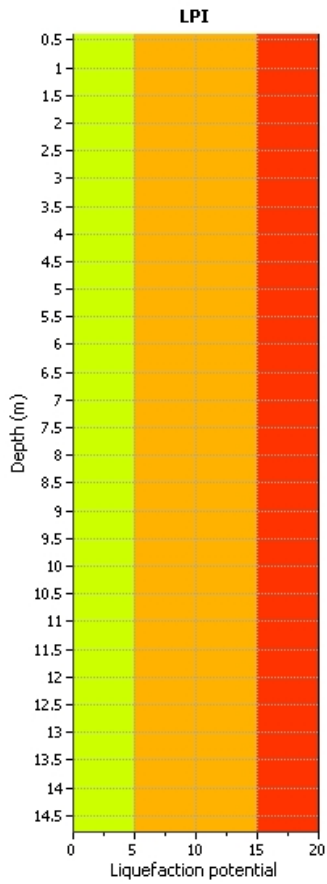
**Grafico 79 - 185130C167**



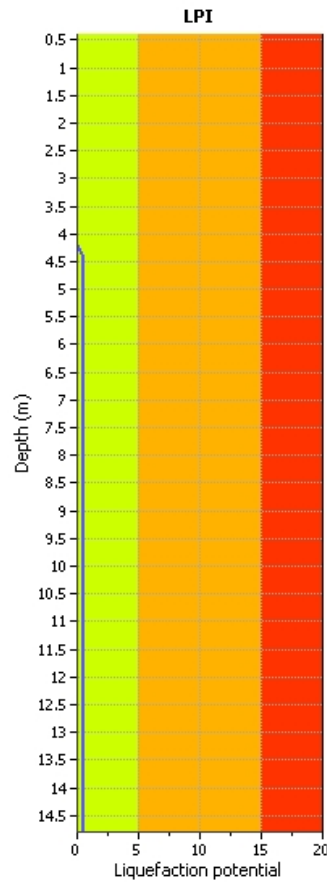
**Grafico 80 - 185130C168**



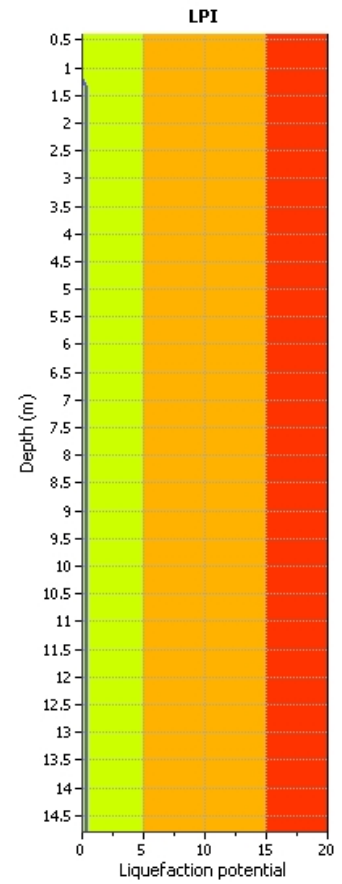
**Grafico 81 - 185130C169**



**Grafico 82 - 185130C170**

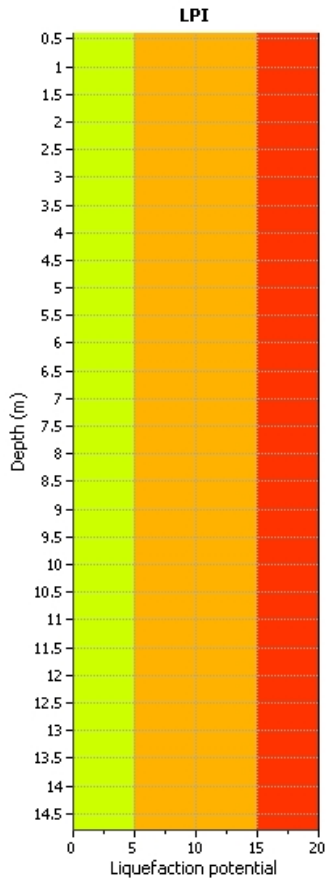


**Grafico 83 - 185130C171**

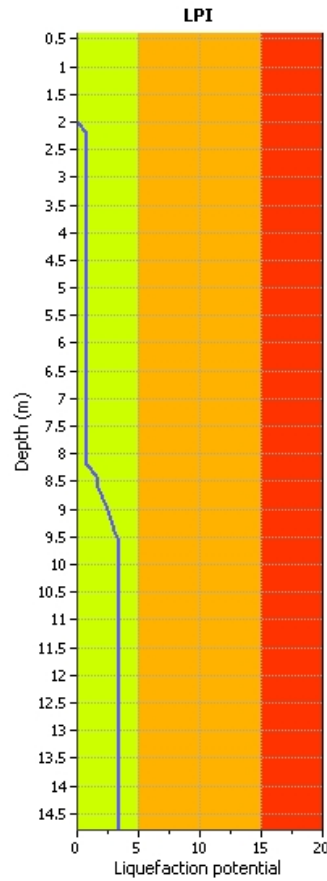


**Grafico 84 - 185130C172**

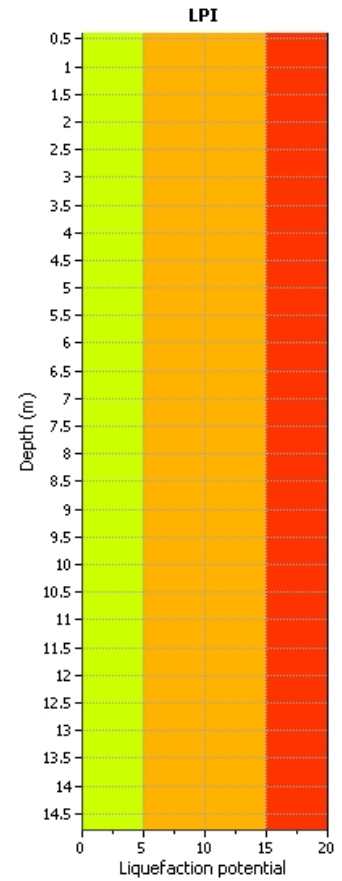




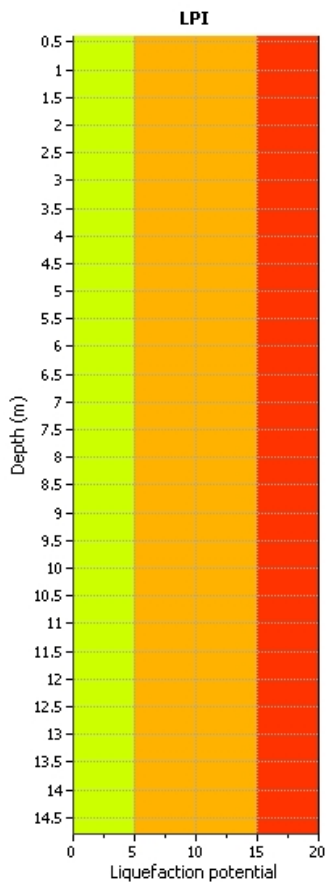
**Grafico 85 - 185130C173**



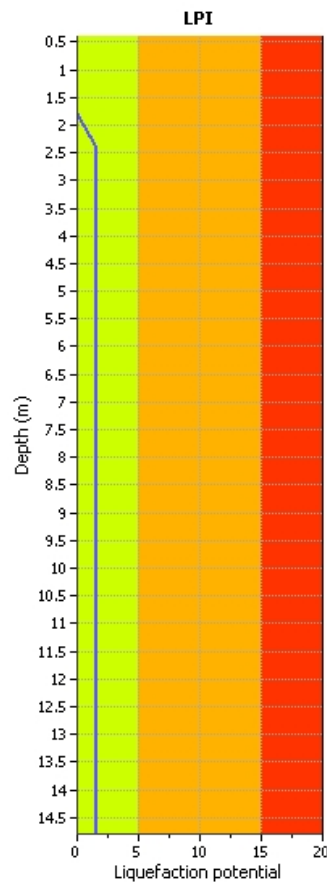
**Grafico 86 - 185130C174**



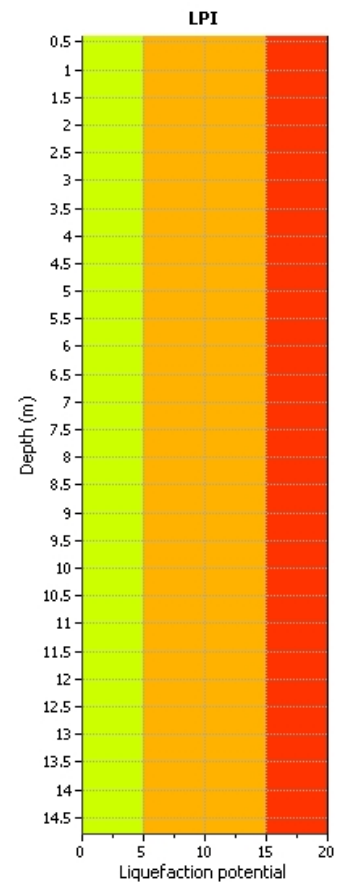
**Grafico 87 - 185130C175**



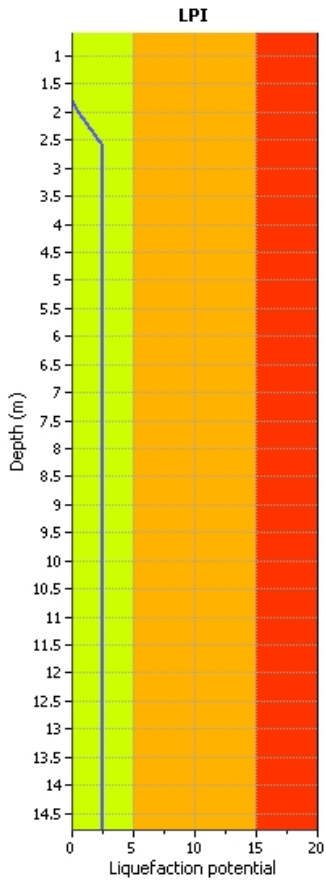
**Grafico 88 - 185130C176**



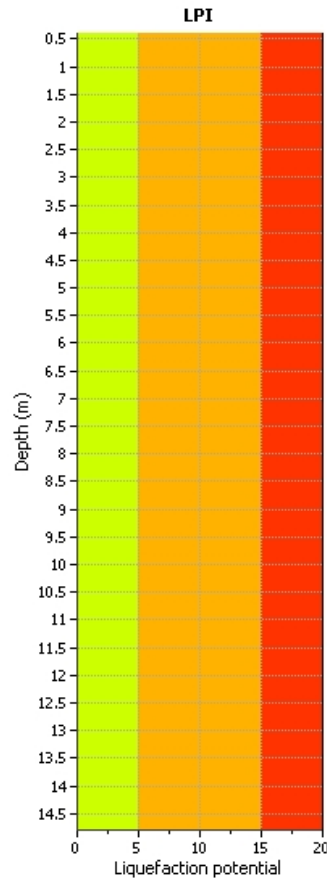
**Grafico 89 - 185130C177**



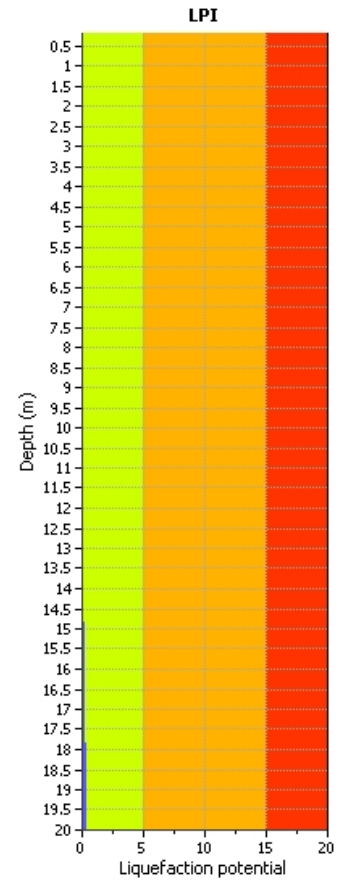
**Grafico 90 - 185130C178**



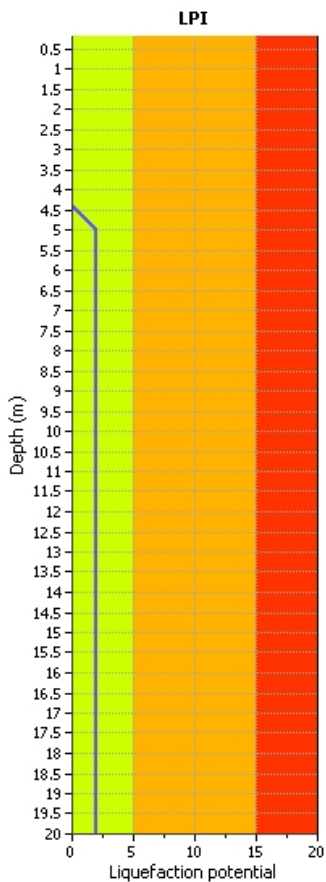
**Grafico 91 - 185130C179**



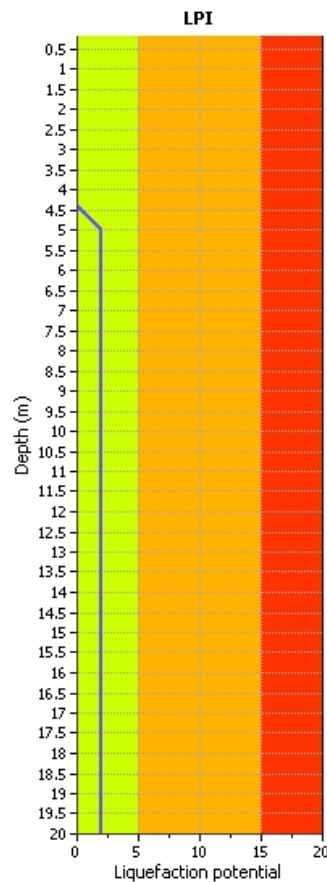
**Grafico 92 - 185130C180**



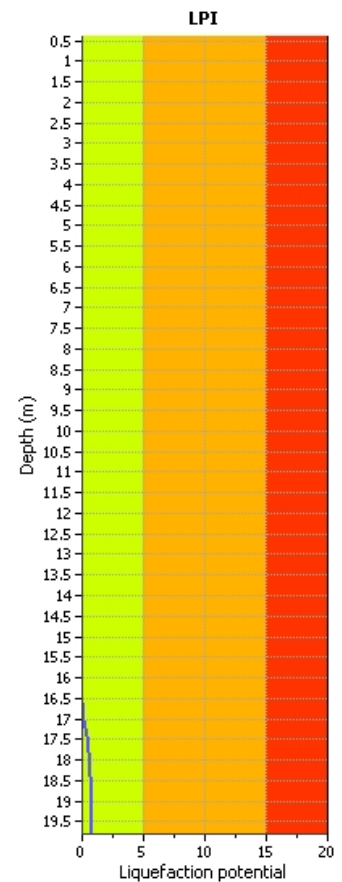
**Grafico 93 - 185130C192**



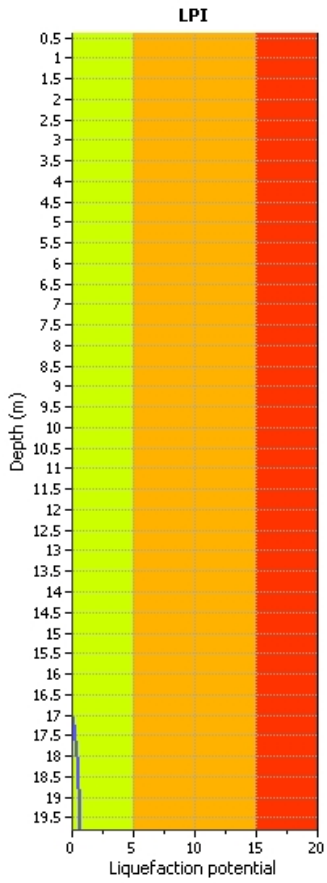
**Grafico 94 - 185130C193**



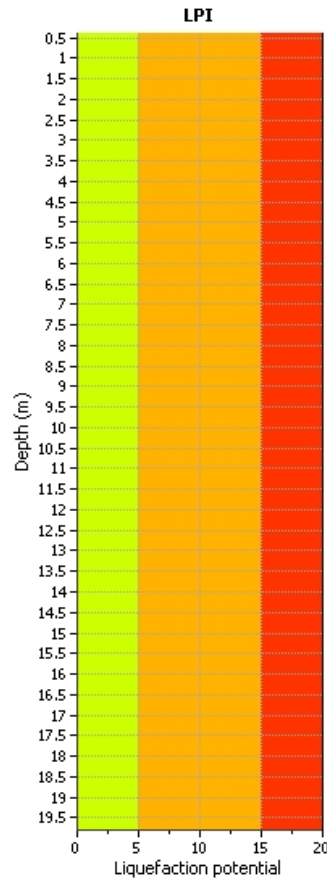
**Grafico 95 - 185130C402**



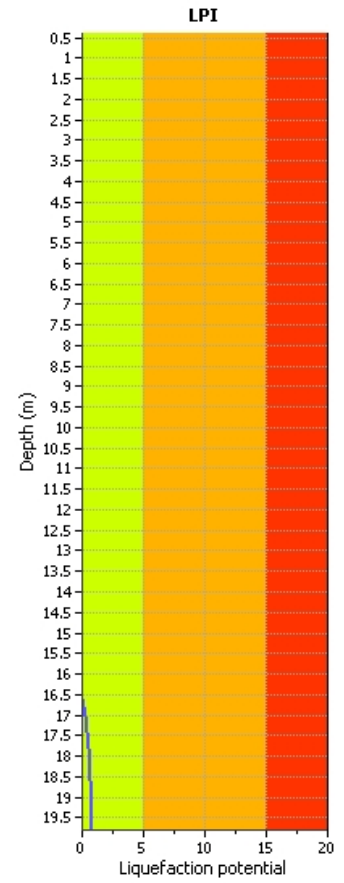
**Grafico 96 - 185130C403**



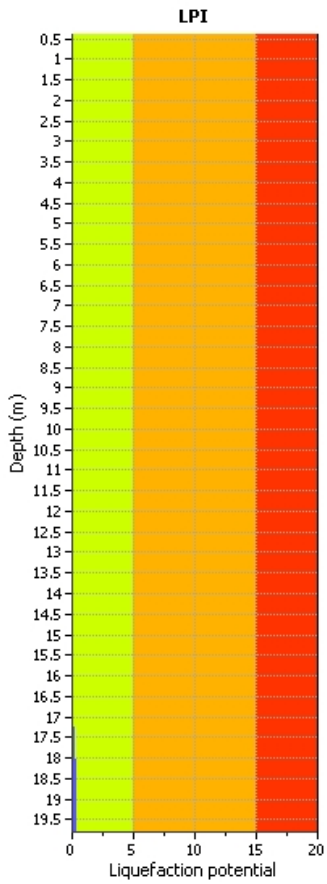
**Grafico 97 - 185130C404**



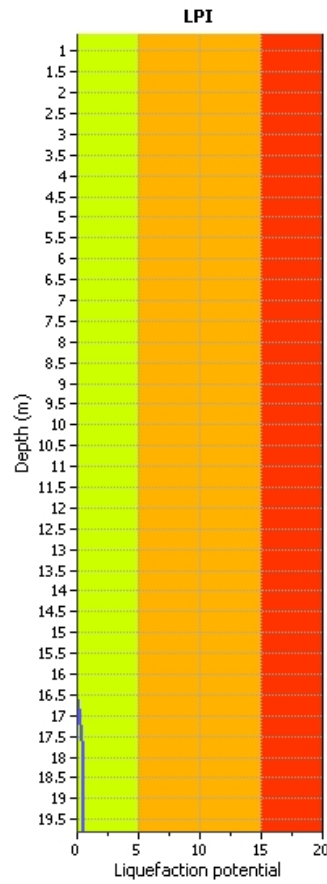
**Grafico 98 - 185130C405**



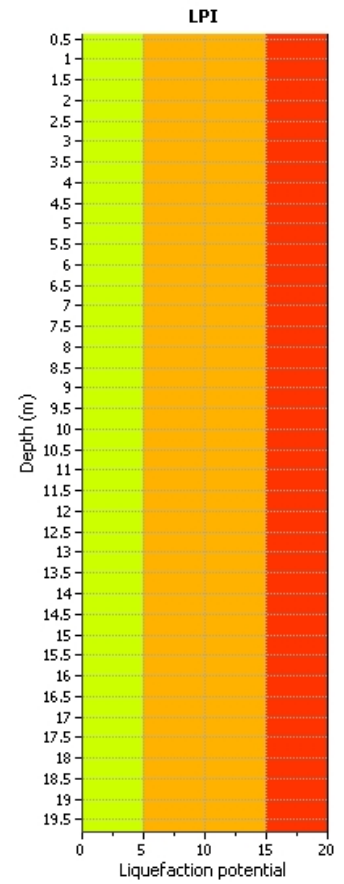
**Grafico 99 - 185130C406**



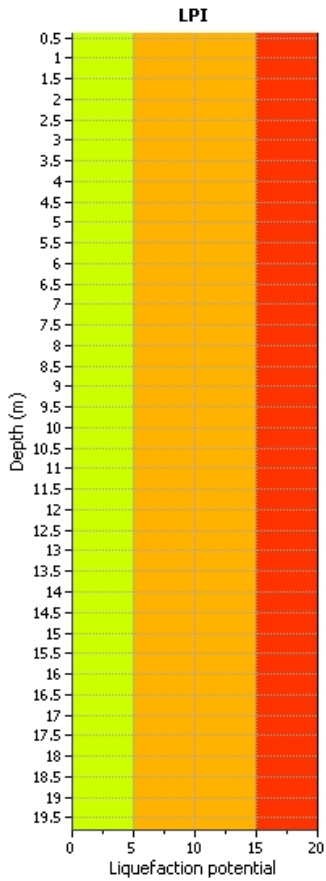
**Grafico 100 - 185130C407**



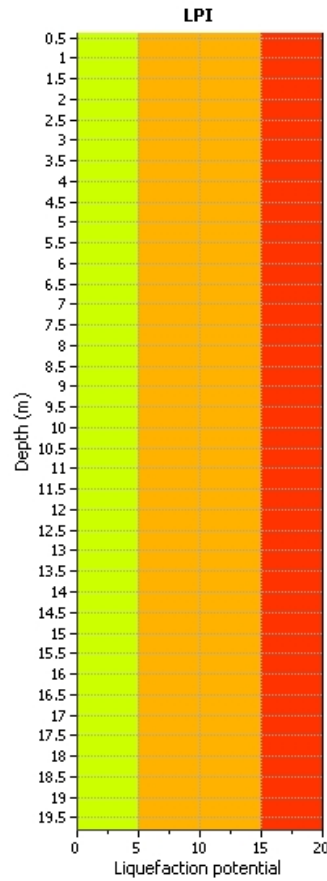
**Grafico 101 - 185130C408**



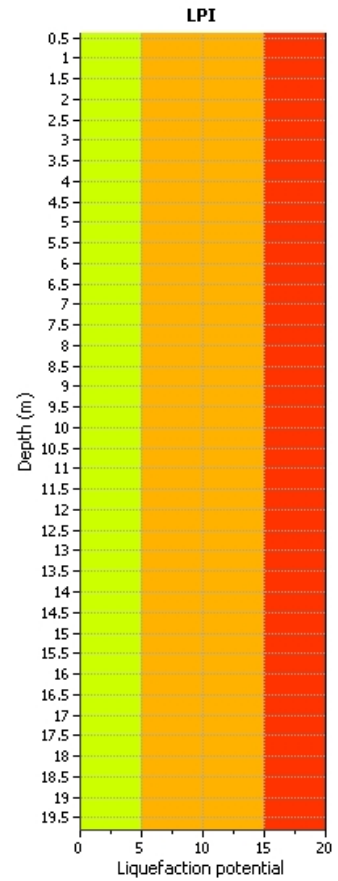
**Grafico 102 - 185130C409**



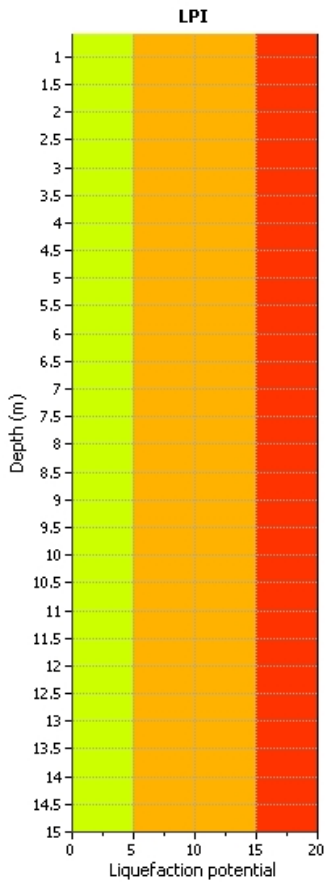
**Grafico 103 - 185130C412**



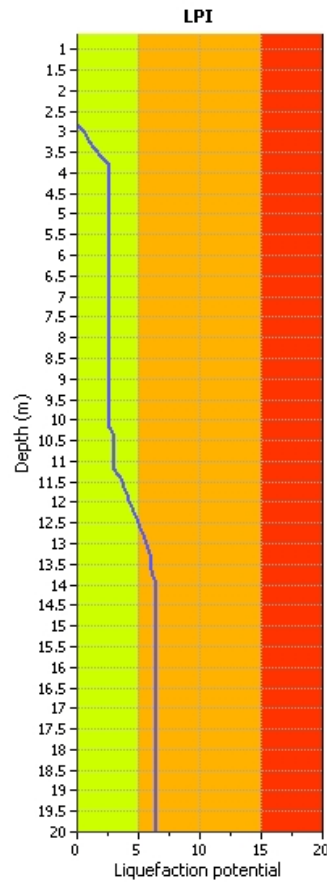
**Grafico 104 - 185130C413**



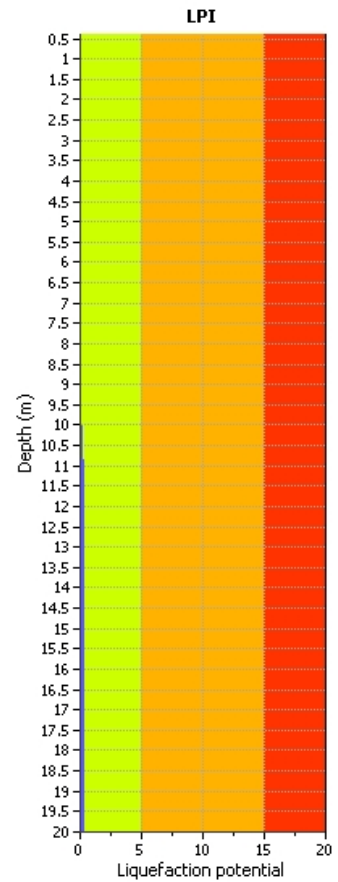
**Grafico 105 - 185130C416**



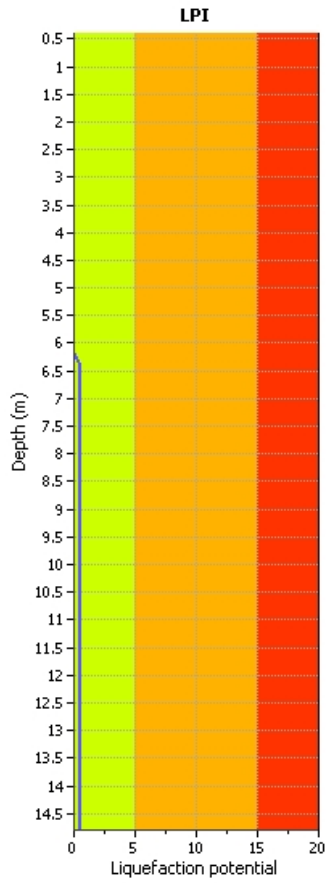
**Grafico 106 - 185130C418**



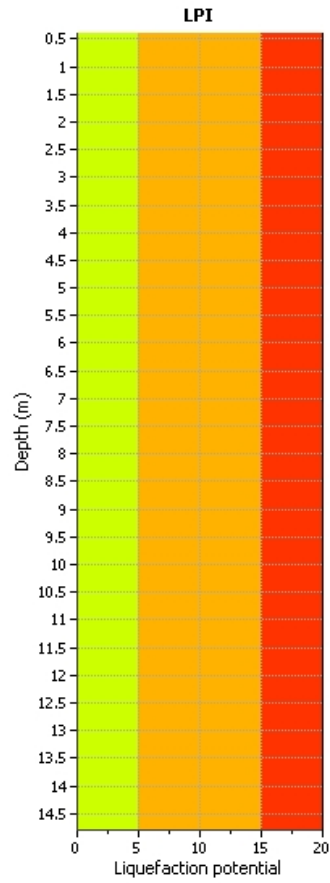
**Grafico 107 - 185130C428**



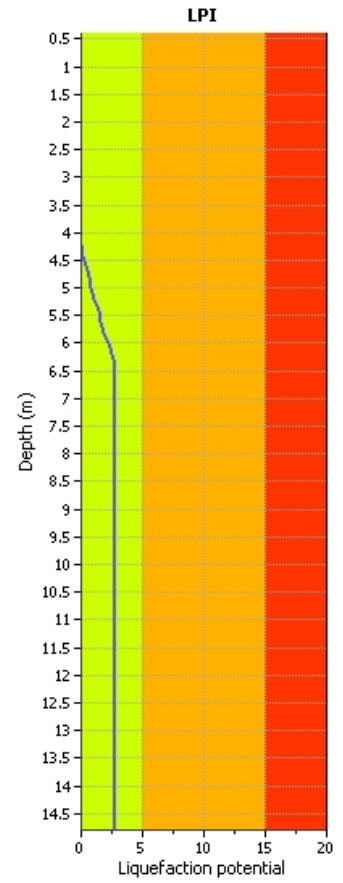
**Grafico 108 - 185130C987**



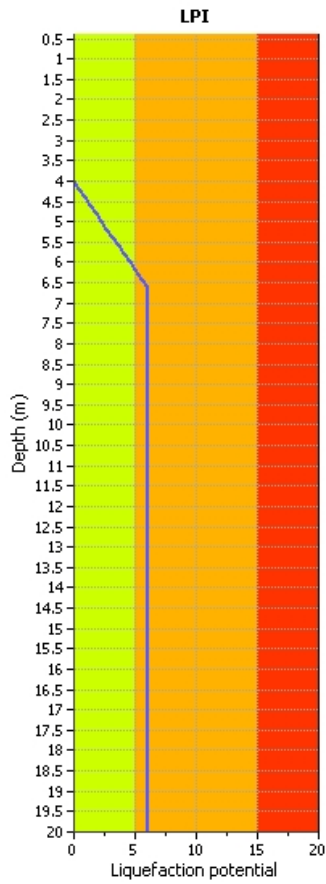
**Grafico 109 - 185130C988**



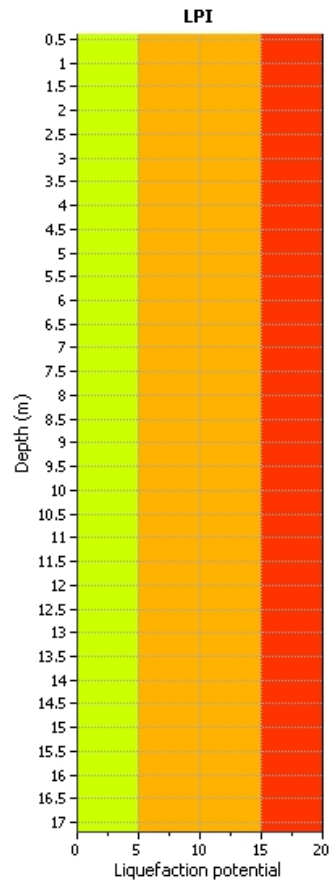
**Grafico 110 - 185130C989**



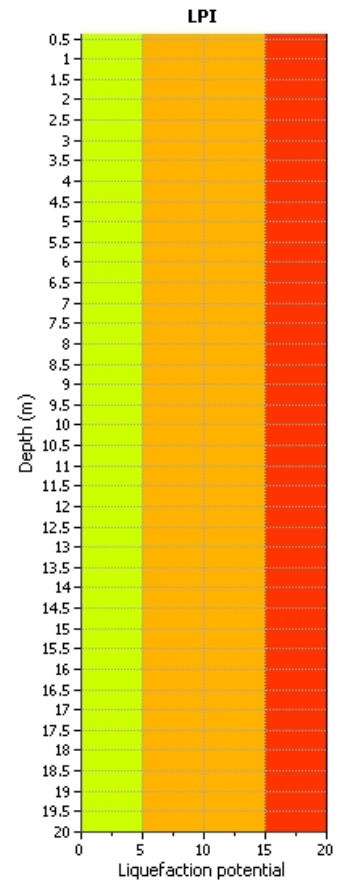
**Grafico 111 - 185130C990**



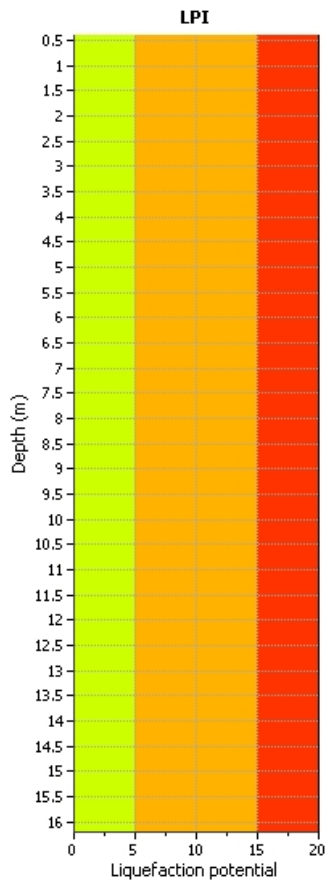
**Grafico 112 - 185130C991**



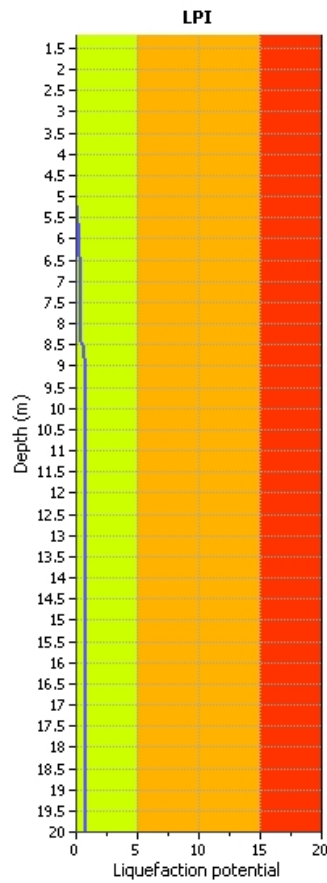
**Grafico 113 - 185130C992**



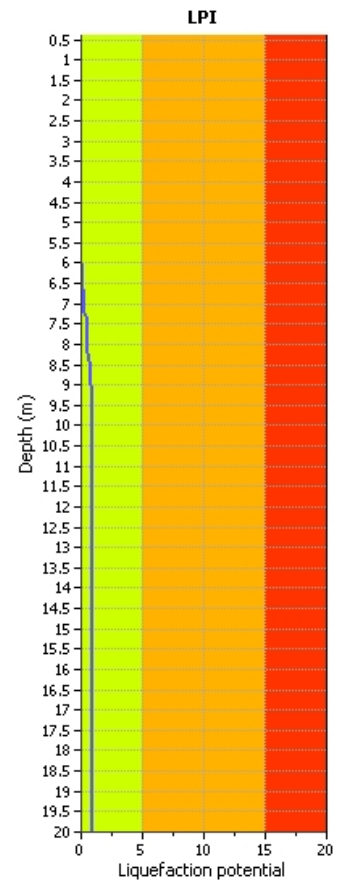
**Grafico 114 - 185130C993**



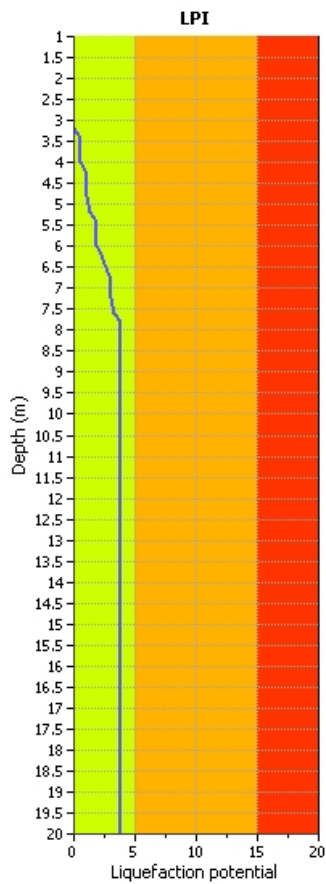
**Grafico 115 - 185130C994**



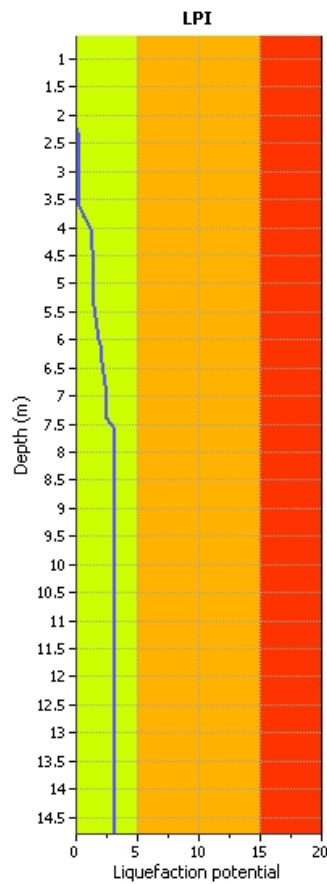
**Grafico 116 - 185130C995**



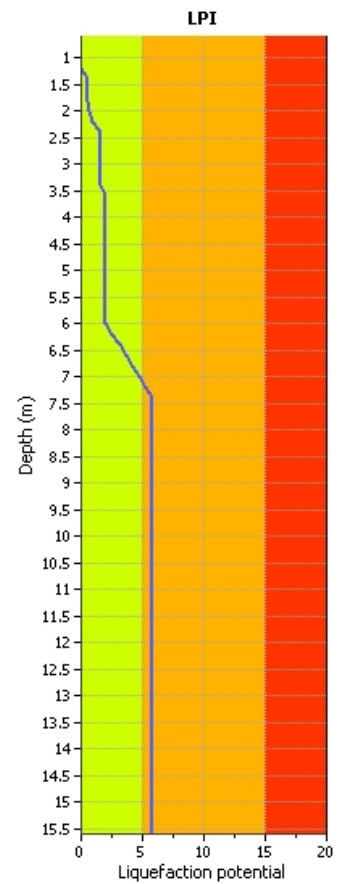
**Grafico 117 - 185130C996**



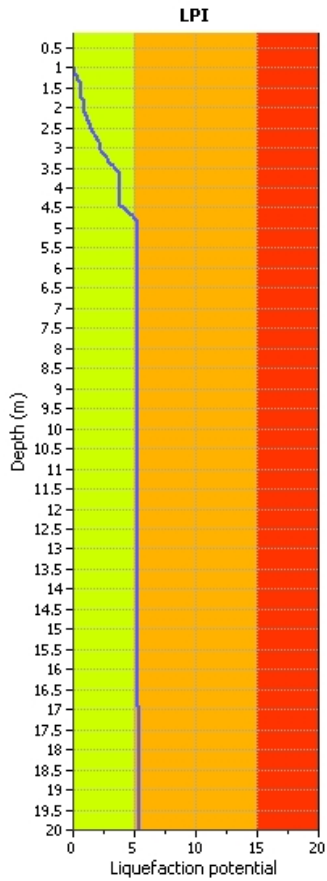
**Grafico 118 - 185130C997**



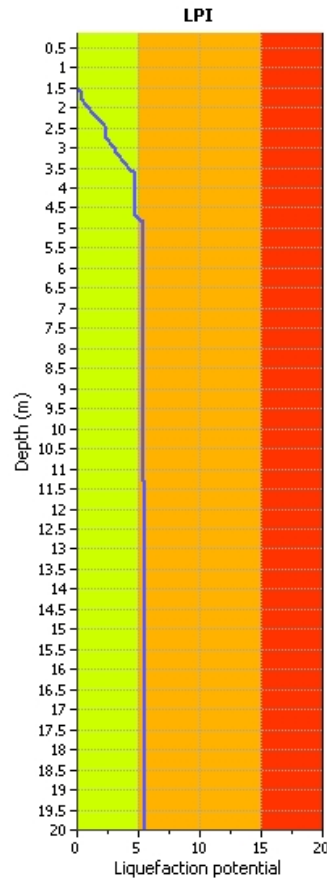
**Grafico 119 - 185130C998**



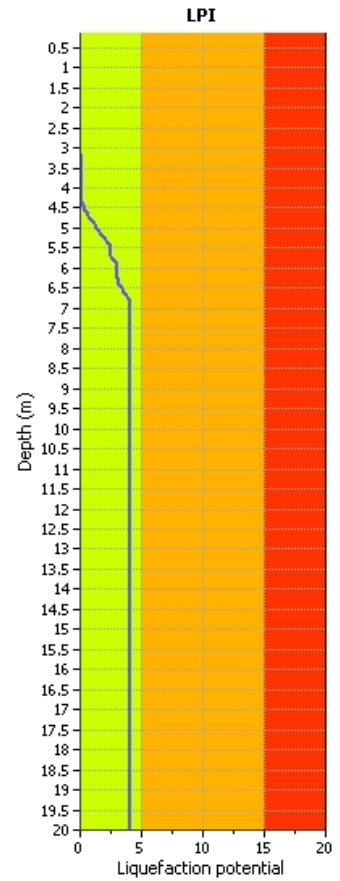
**Grafico 120 - 185130C999**



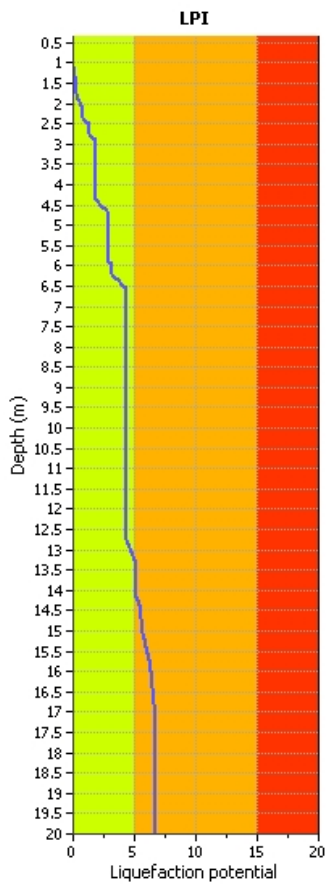
**Grafico 121 - 185130E040**



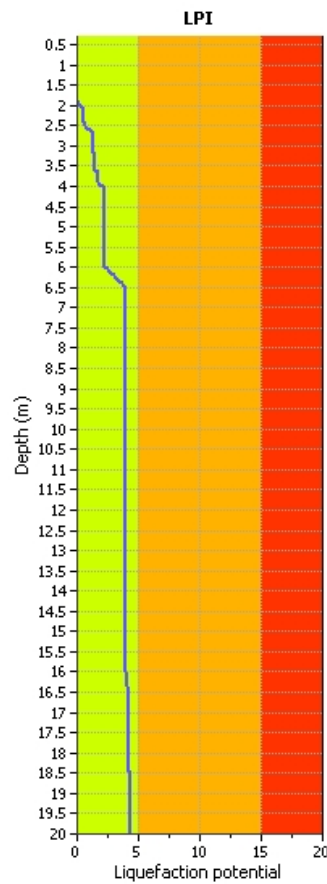
**Grafico 122 - 185130E042**



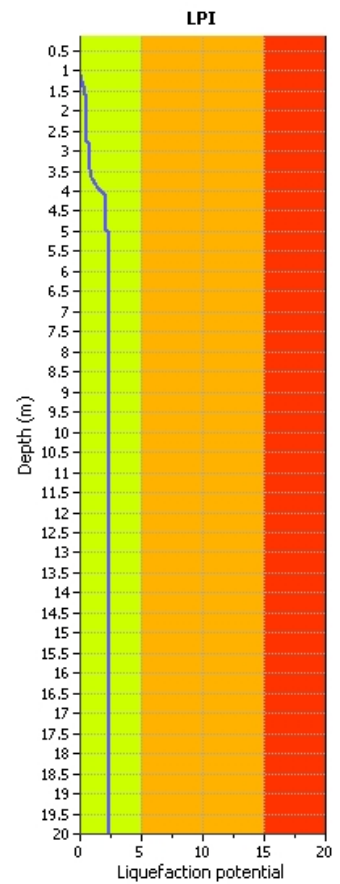
**Grafico 123 - 185130E044**



**Grafico 124 - 185130E045**

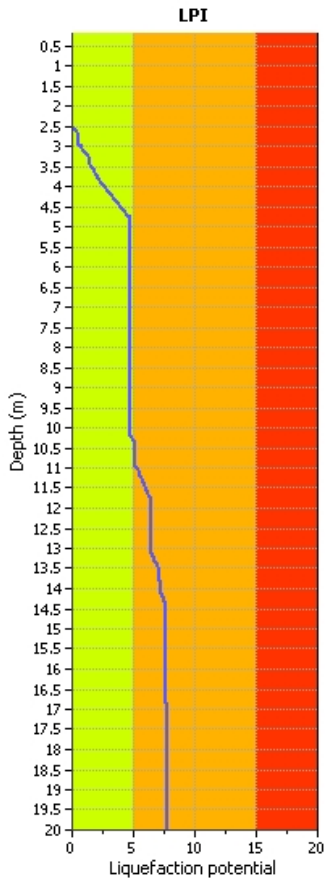


**Grafico 125 - 185130E427**

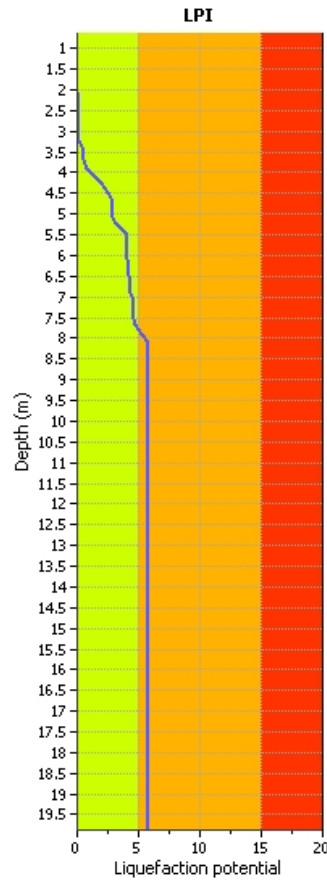


**Grafico 126 - 185130E430**

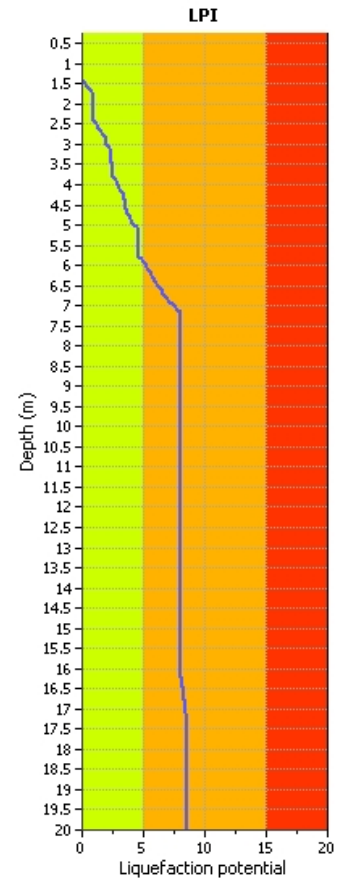




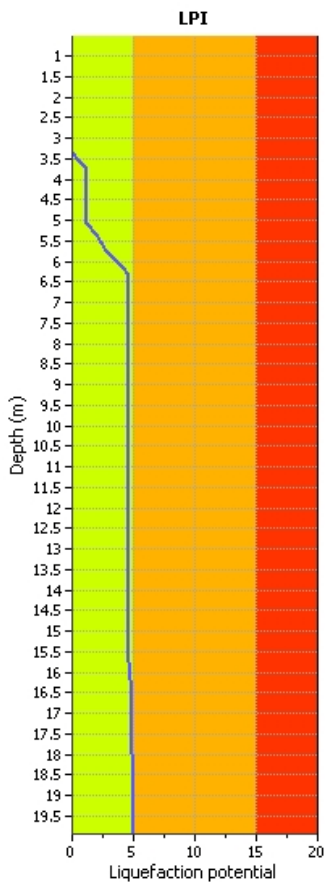
**Grafico 127 - 185130E431**



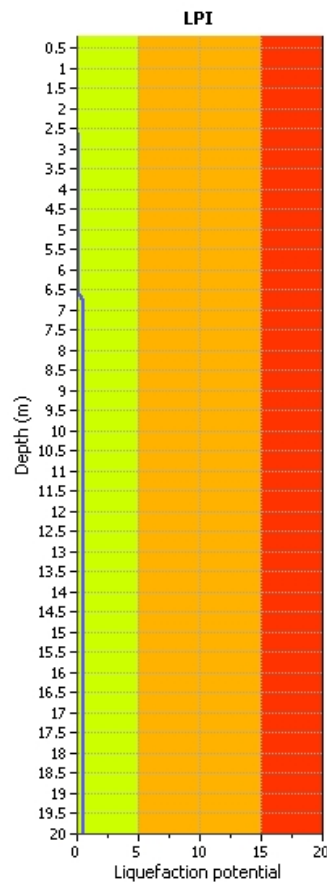
**Grafico 128 - 185130E432**



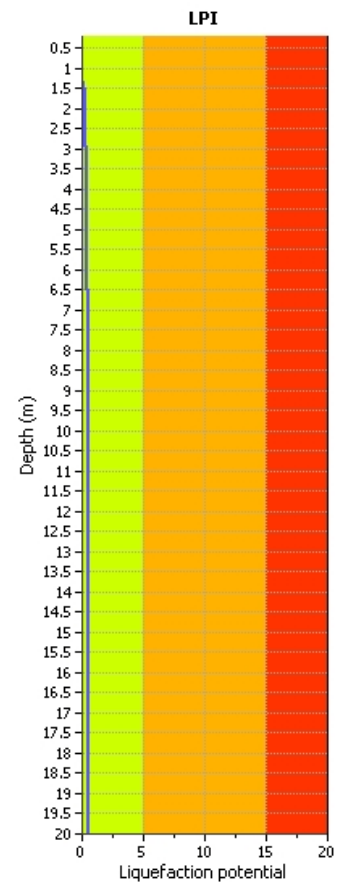
**Grafico 129 - 185130E433**



**Grafico 130 - 185130E434**

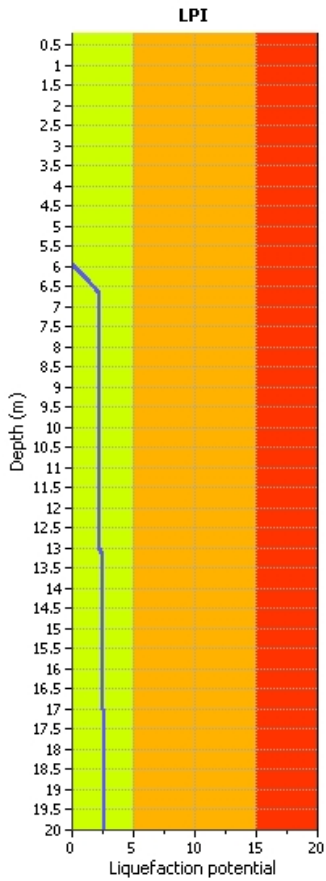


**Grafico 131 - 185130U004**

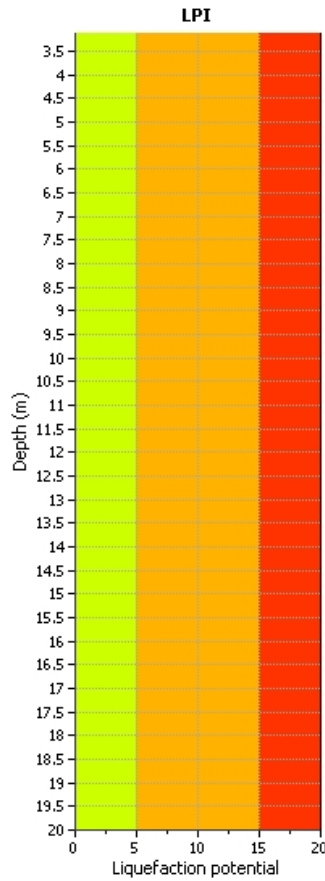


**Grafico 132 - 185130U005**

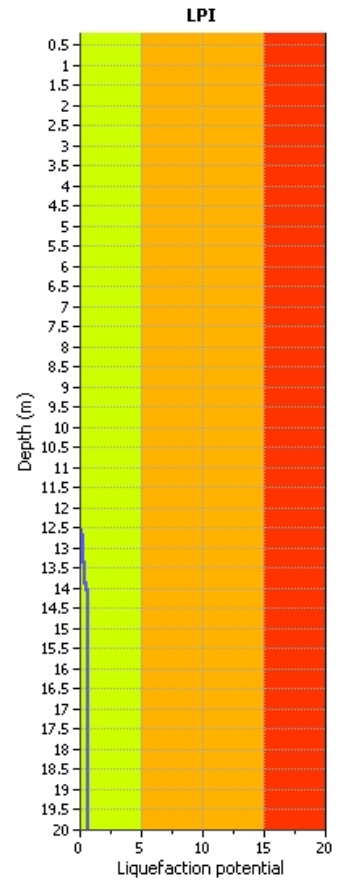




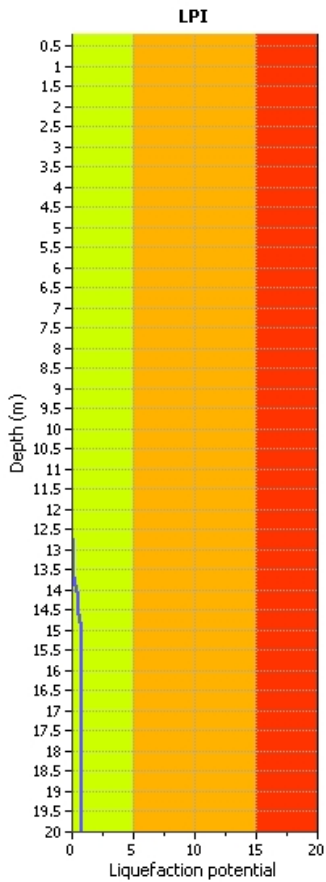
**Grafico 133 - 185130U006**



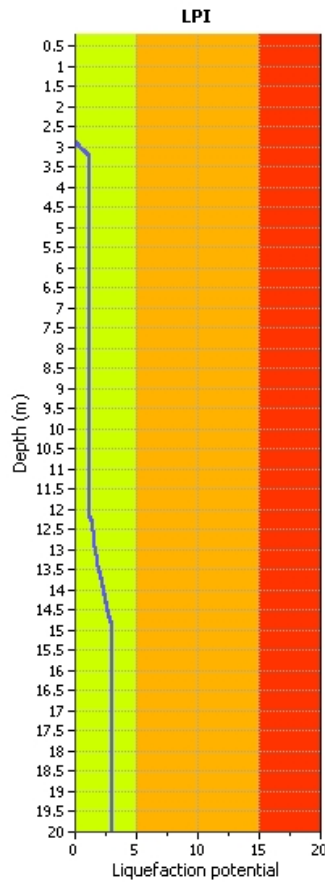
**Grafico 134 - 185130U007**



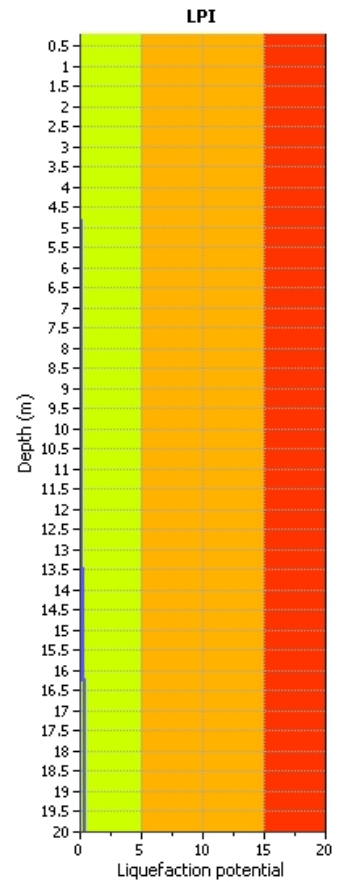
**Grafico 135 - 185130U008**



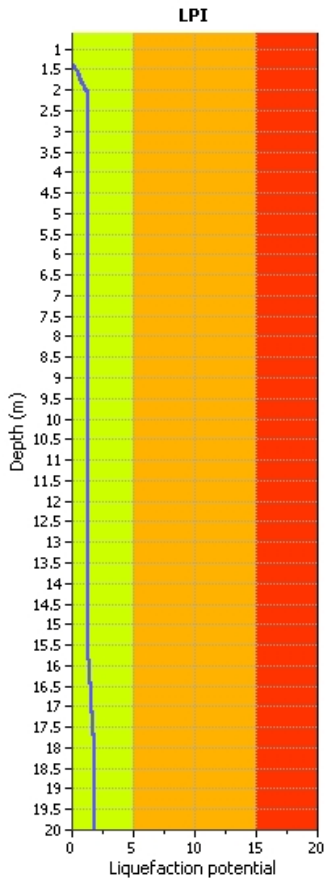
**Grafico 136 - 185130U009**



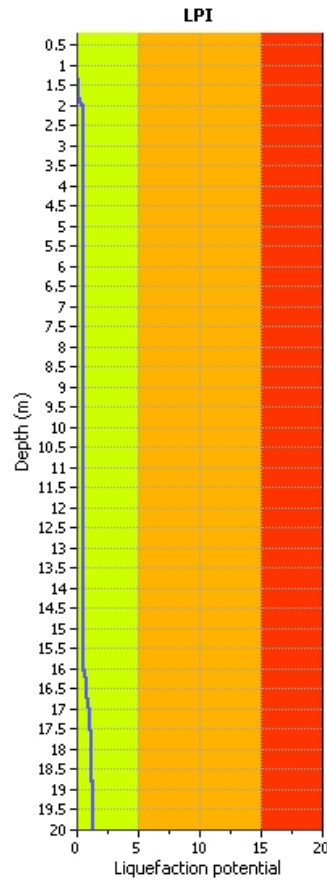
**Grafico 137 - 185130U010**



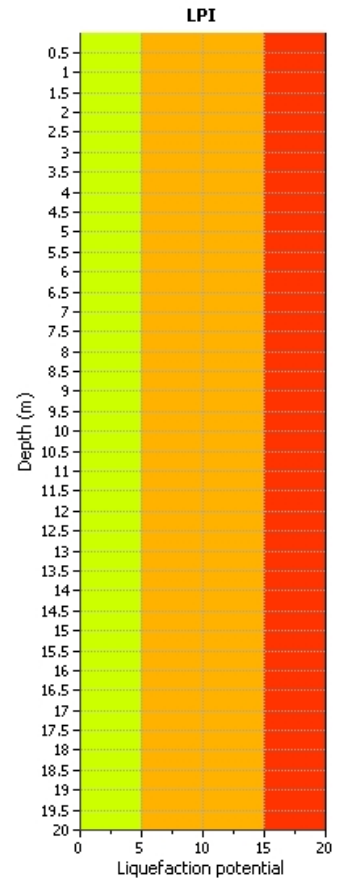
**Grafico 138 - 185130U011**



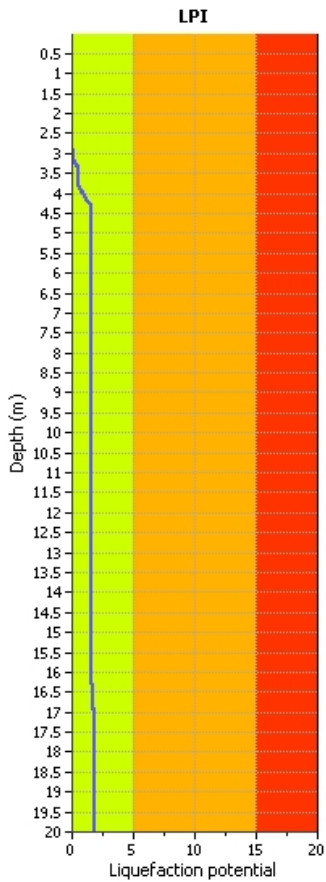
**Grafico 139 - 185130U019**



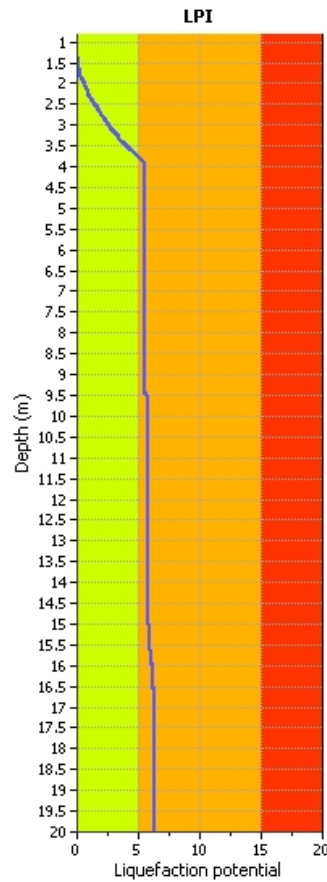
**Grafico 140 - 185130U020**



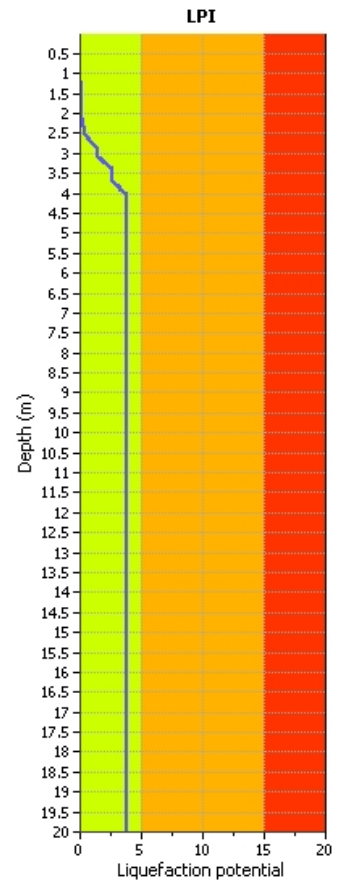
**Grafico 141 - 185130U021**



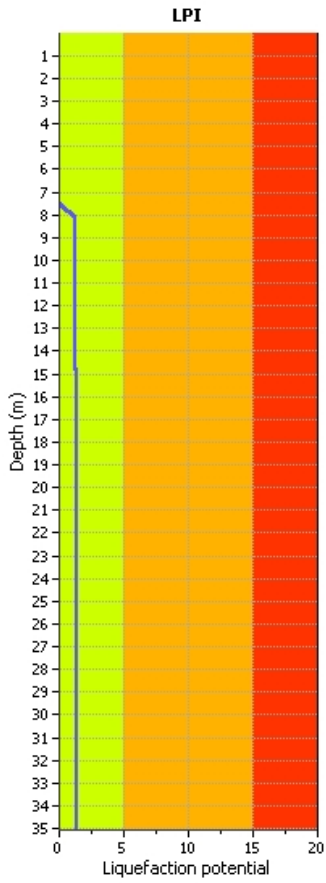
**Grafico 142 - 185130U022**



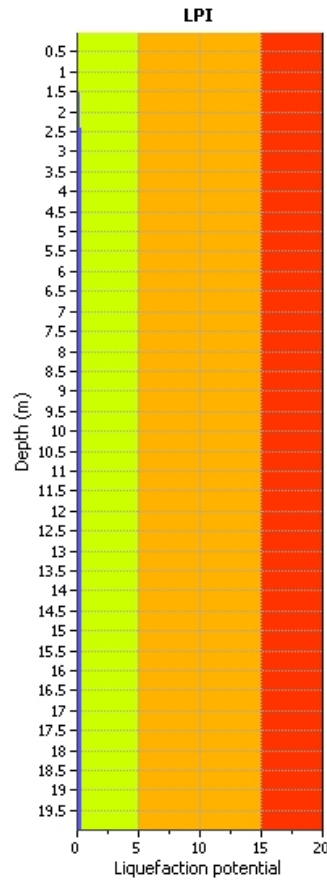
**Grafico 143 - 185130U023**



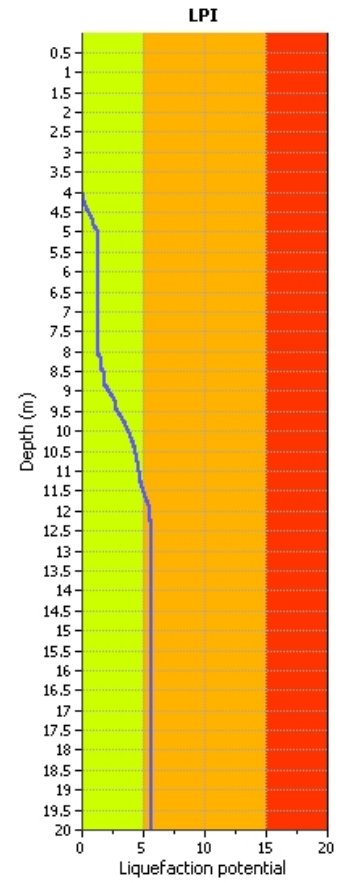
**Grafico 144 - 185130U024**



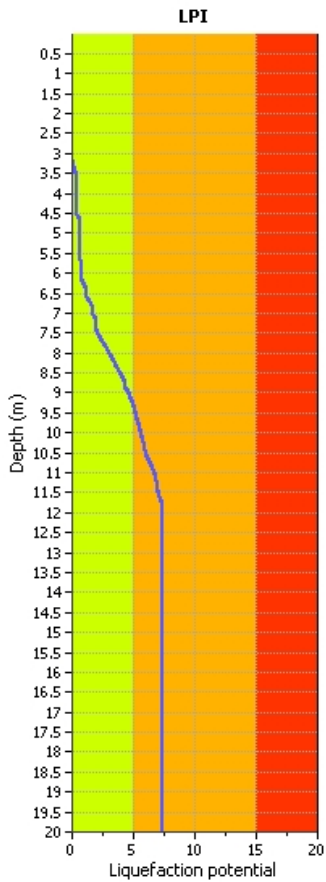
**Grafico 145 - 185130U503**



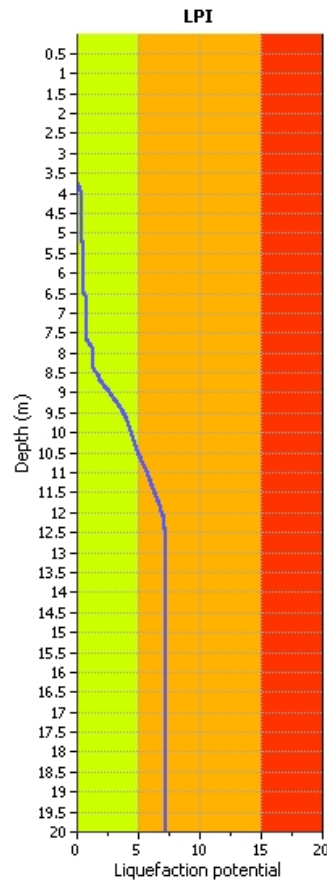
**Grafico 146 - 185130U504**



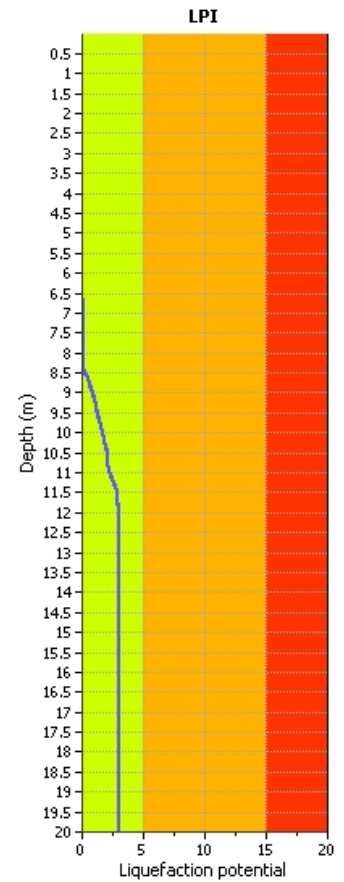
**Grafico 147 - 185130U505**



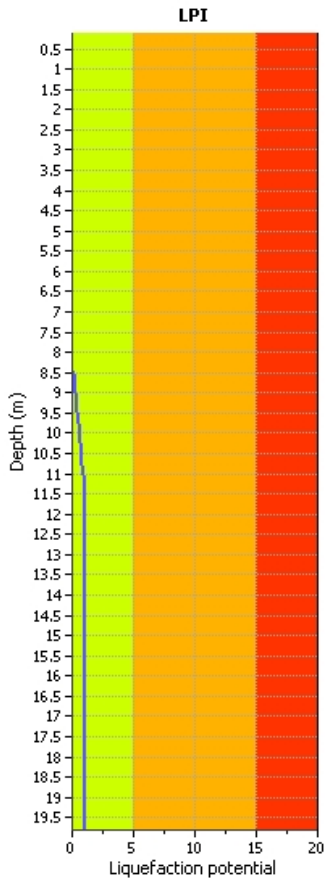
**Grafico 148 - 185130U506**



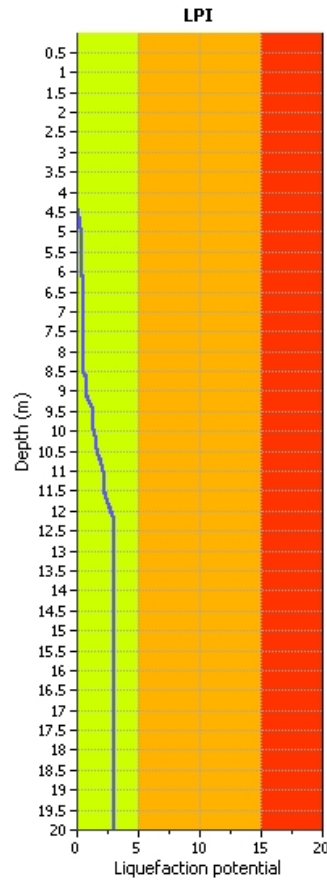
**Grafico 149 - 185130U507**



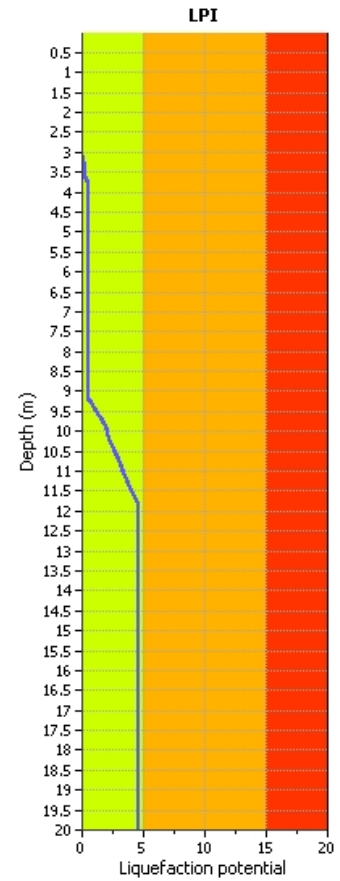
**Grafico 150 - 185130U508**



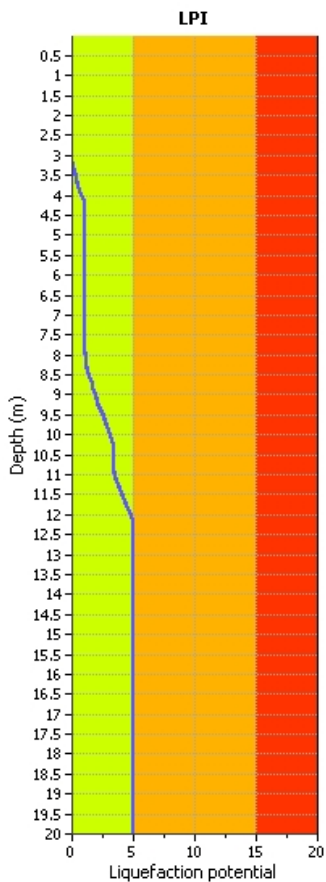
**Grafico 151 - 185130U509**



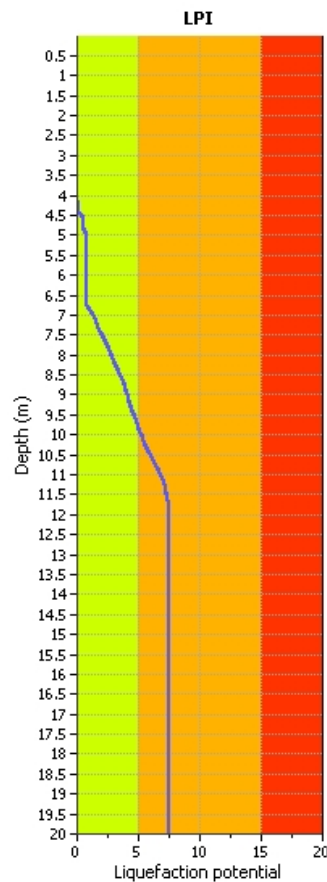
**Grafico 152 - 185130U510**



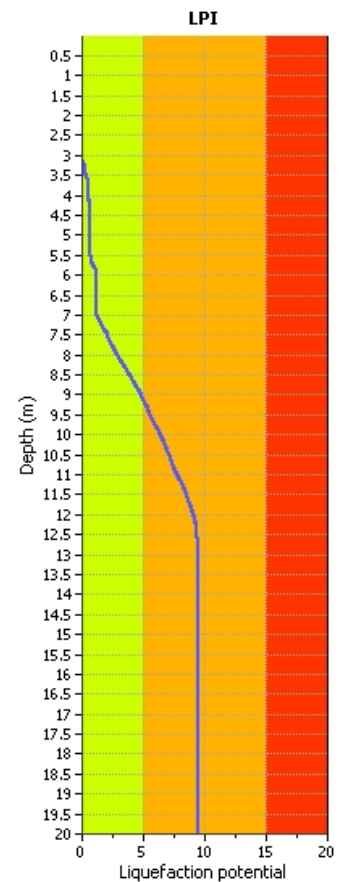
**Grafico 153 - 185130U511**



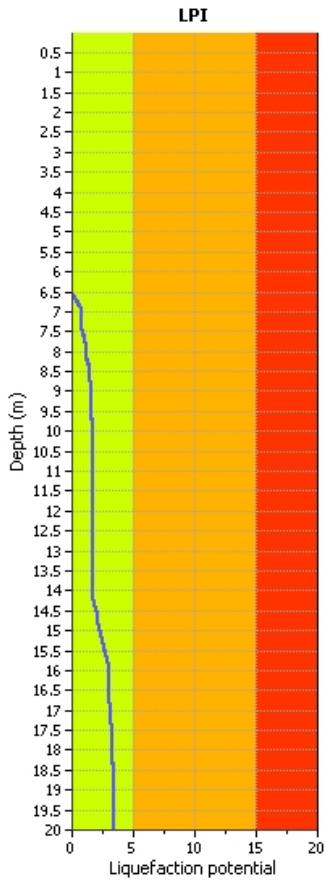
**Grafico 154 - 185130U512**



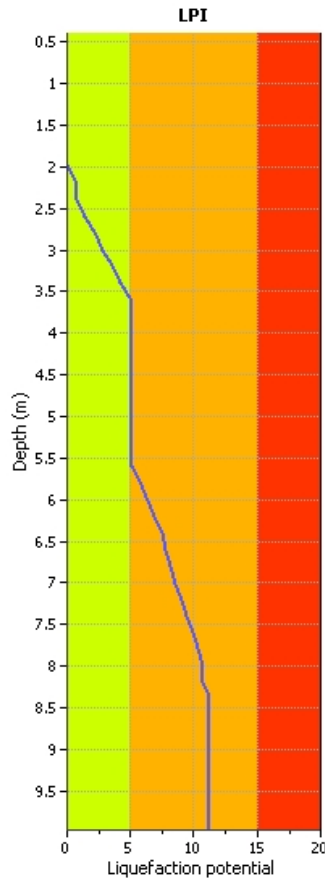
**Grafico 155 - 185130U513**



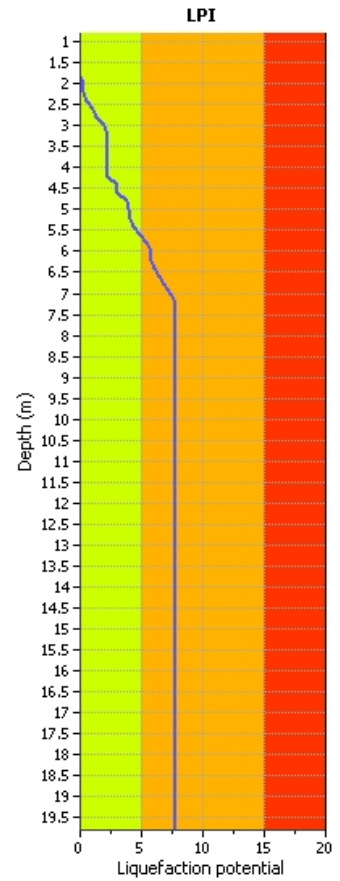
**Grafico 156 - 185130U514**



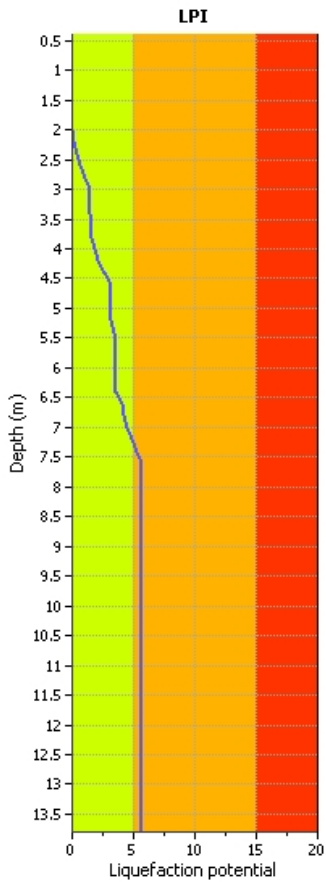
**Grafico 157 - 185140B001**



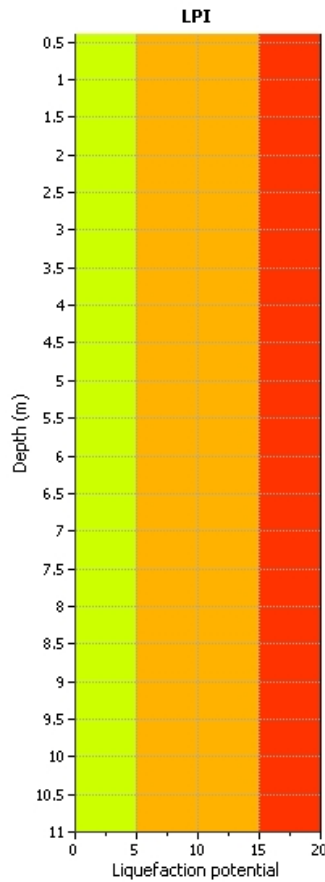
**Grafico 158 - 185140C001**



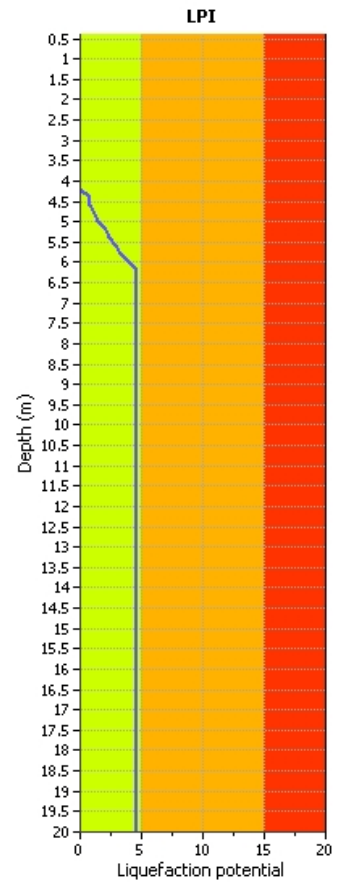
**Grafico 159 - 185140C174**



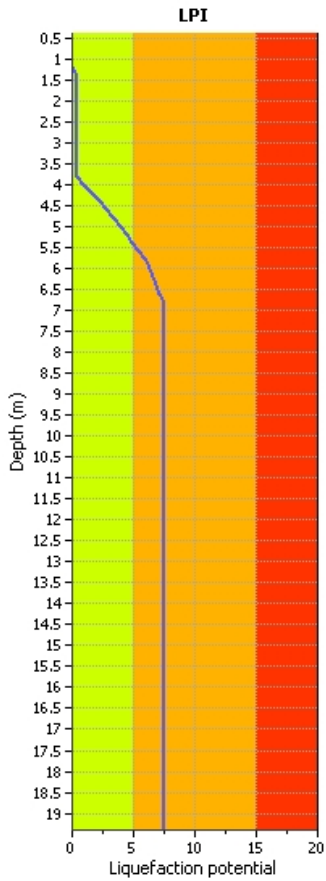
**Grafico 160 - 185140C175**



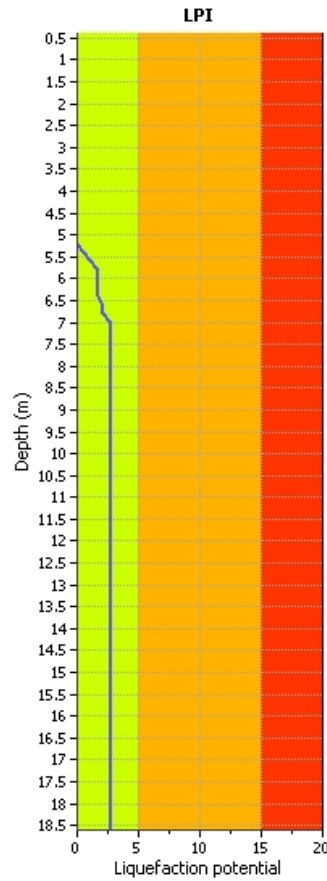
**Grafico 161 - 185140C222**



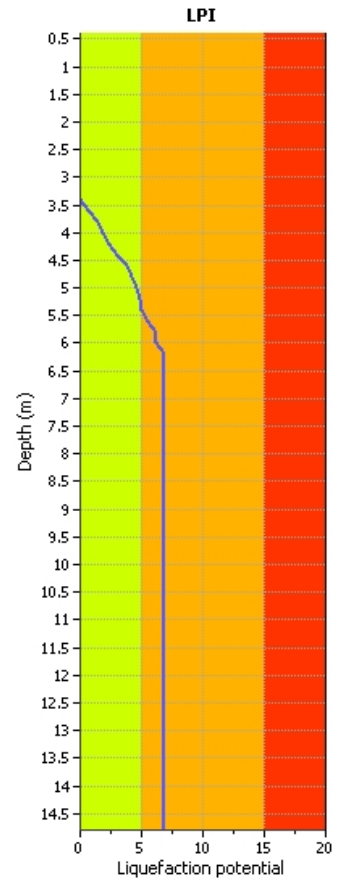
**Grafico 162 - 185140C249A**



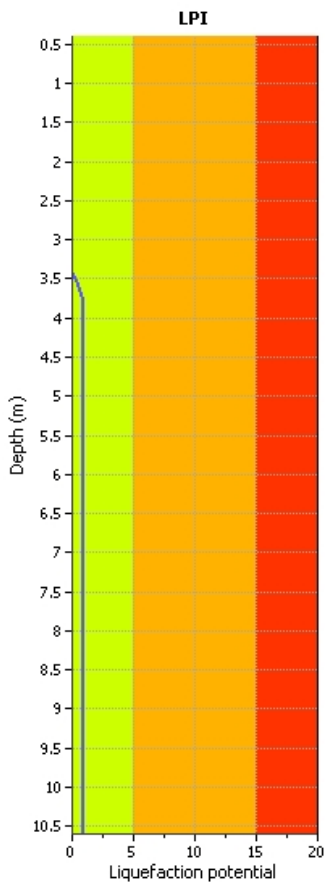
**Grafico 163 - 185140C249B**



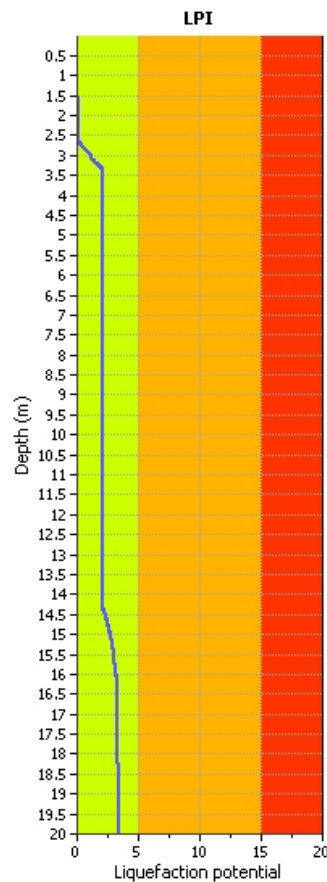
**Grafico 164 - 185140C249C**



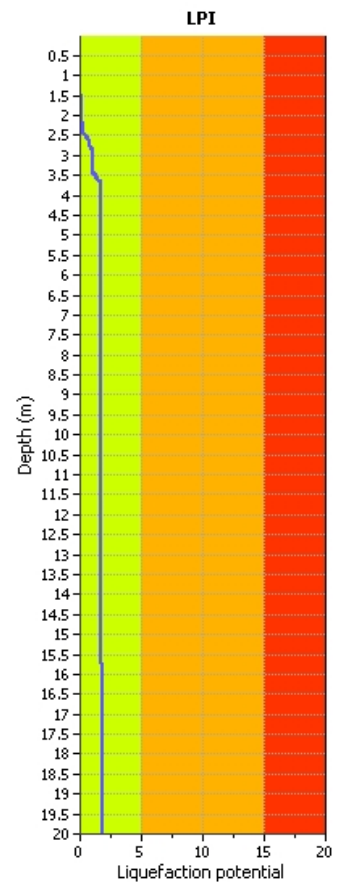
**Grafico 165 - 185140C250**



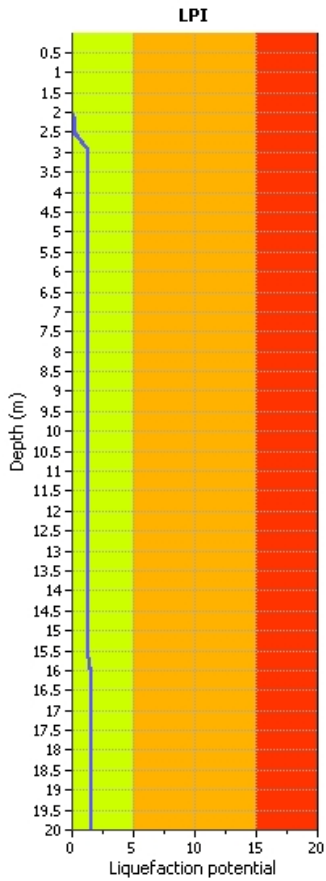
**Grafico 166 - 185140C255**



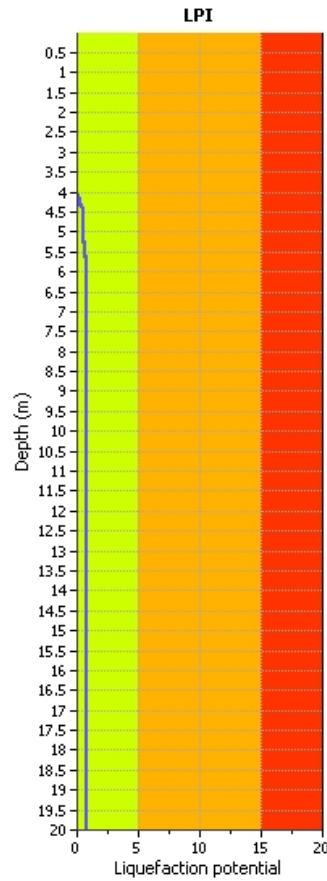
**Grafico 167 - 185140U002**



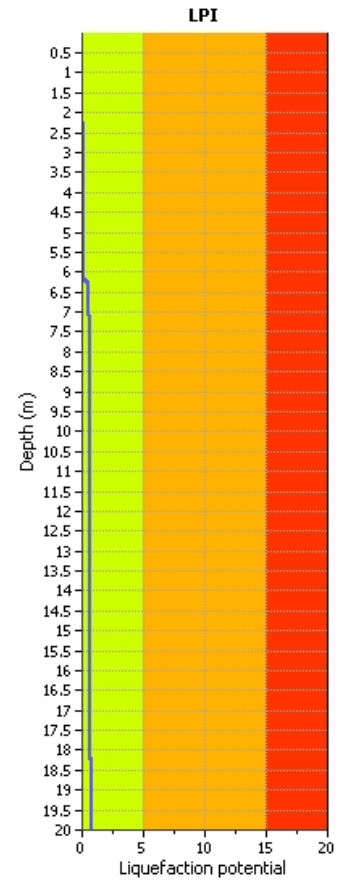
**Grafico 168 - 185140U003**



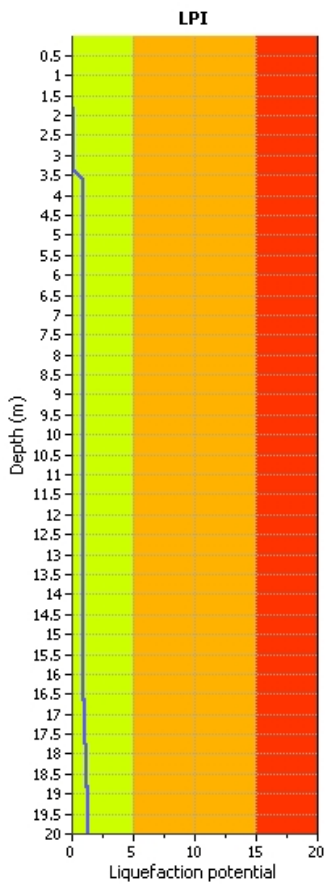
**Grafico 169 - 185130U004**



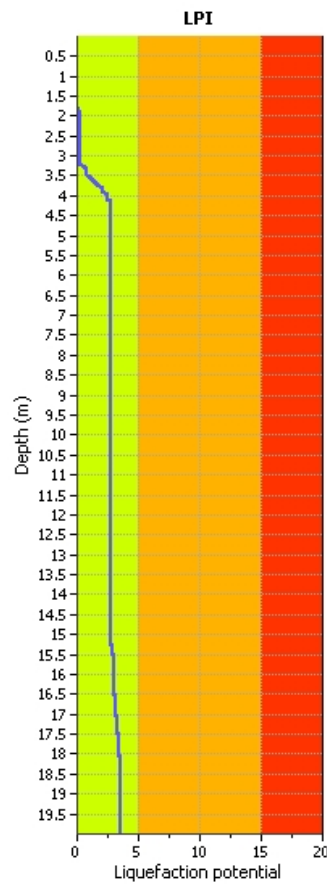
**Grafico 170 - 185130U005**



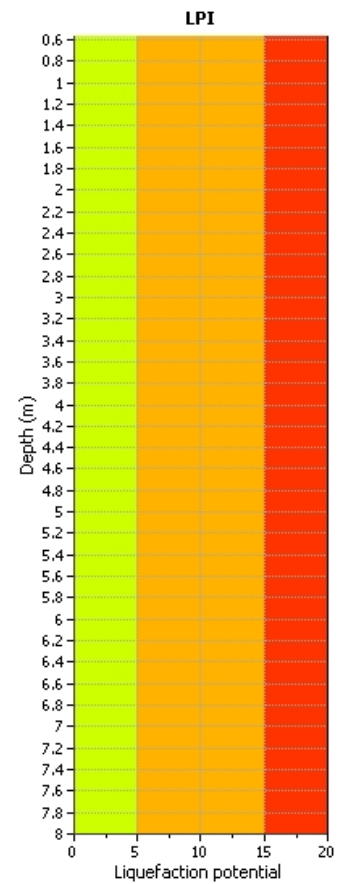
**Grafico 171 - 2020240B999**



**Grafico 172 - 203010B001**

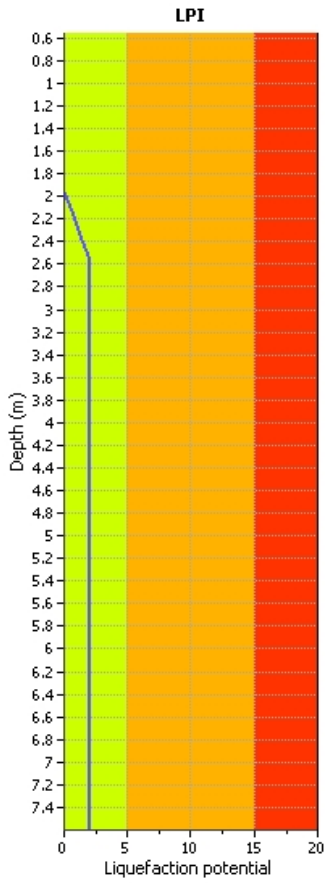


**Grafico 173 - 203010B999**

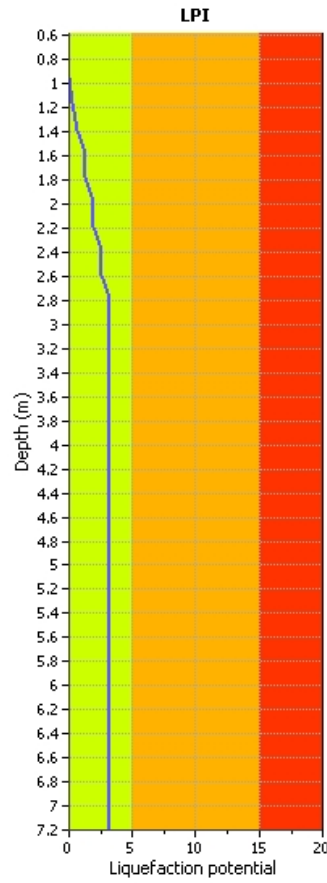


**Grafico 174 - 203010C001**

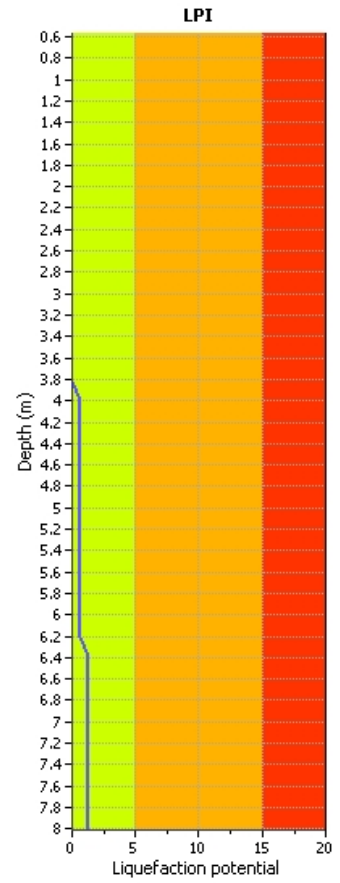




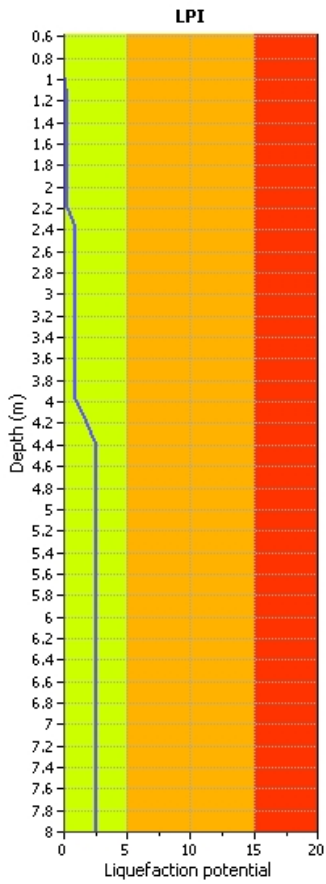
**Grafico 175 - 203010C002**



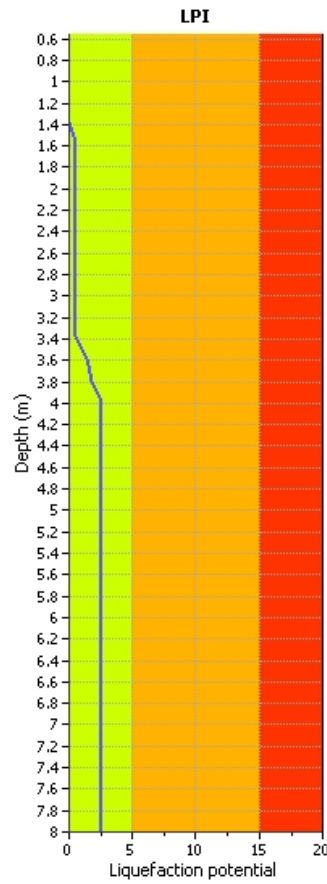
**Grafico 176 - 203010C003**



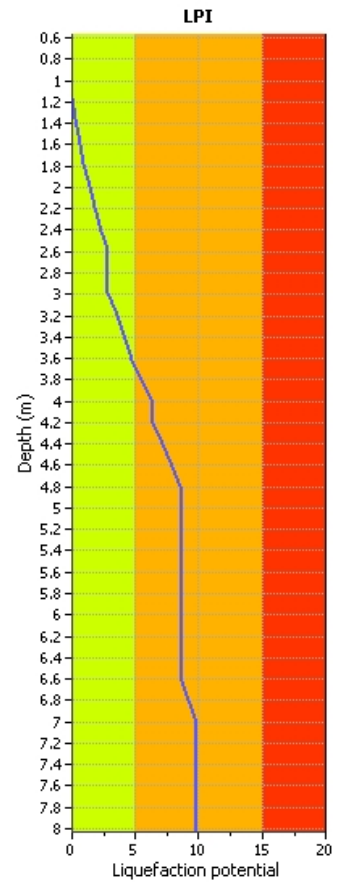
**Grafico 177 - 203010C004**



**Grafico 178 - 203010C005**

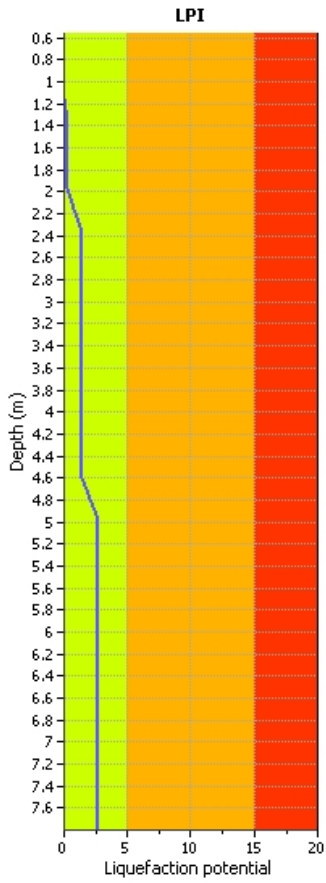


**Grafico 179 - 203010C006**

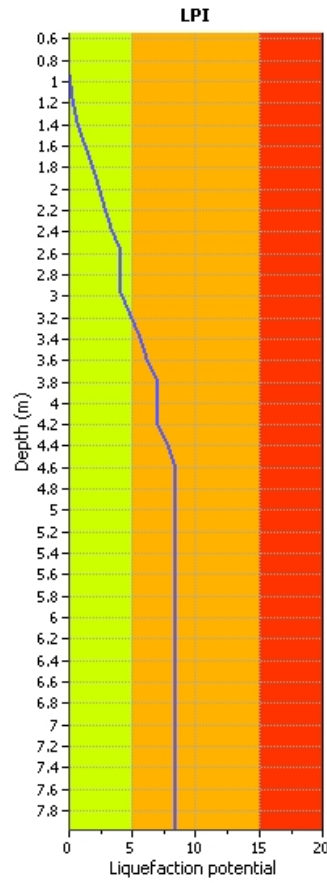


**Grafico 180 - 203010C007**

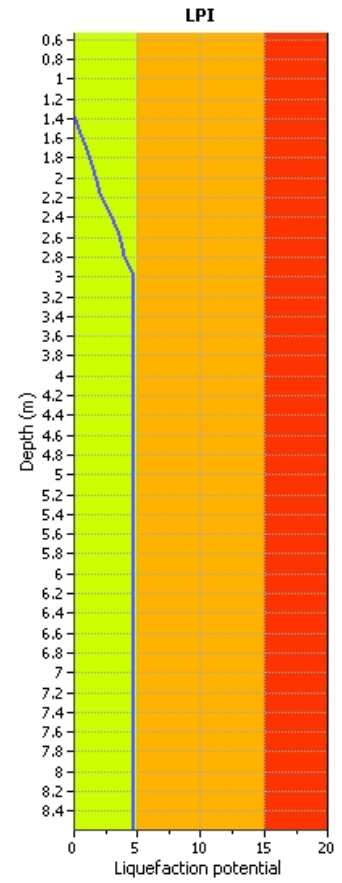




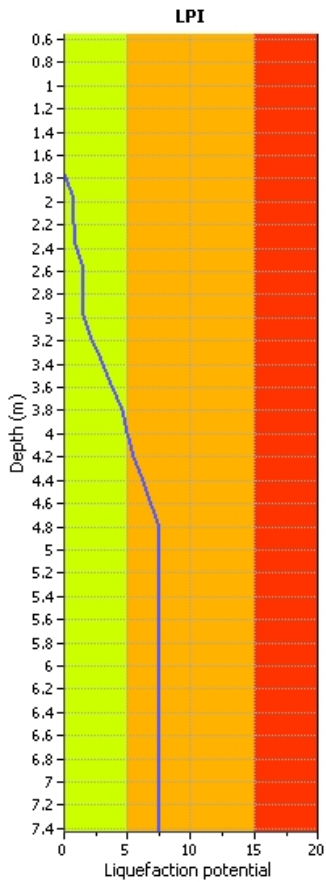
**Grafico 181 - 203010C008**



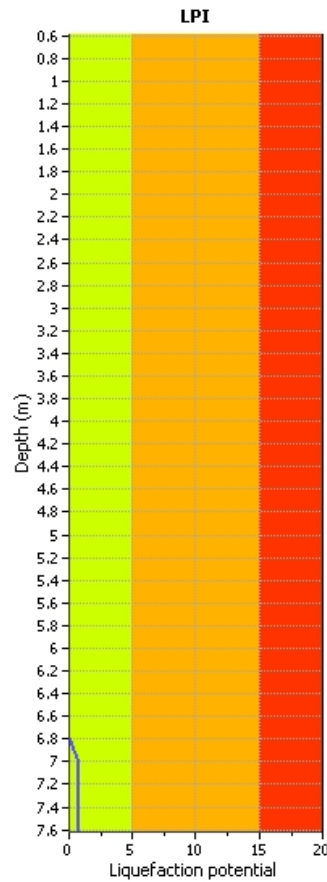
**Grafico 182 - 203010C009**



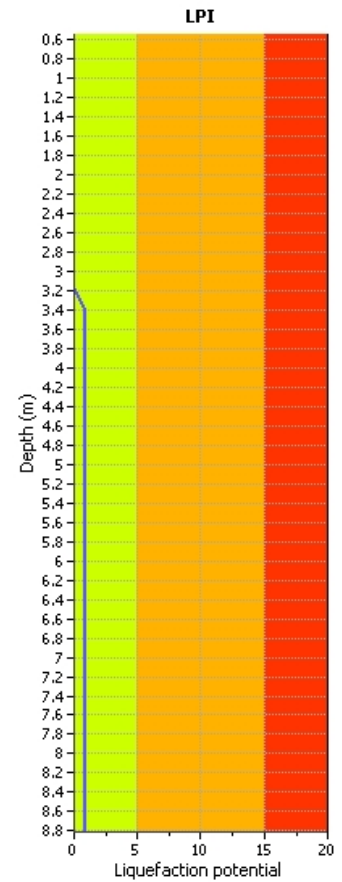
**Grafico 183 - 203010C010**



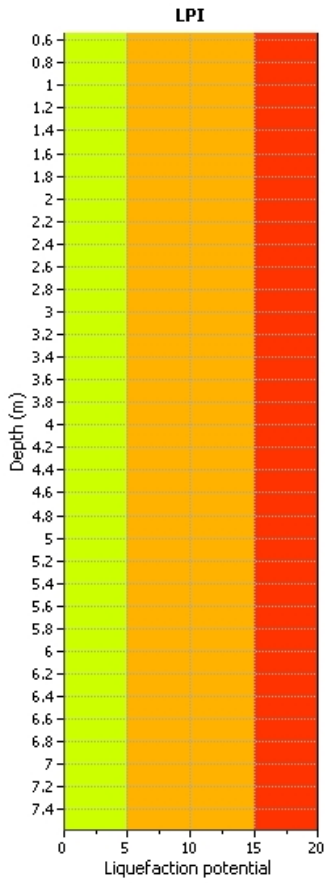
**Grafico 184 - 203010C011**



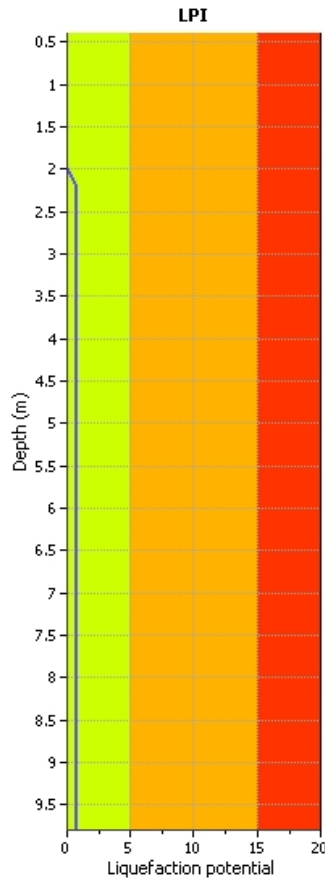
**Grafico 185 - 203010C012**



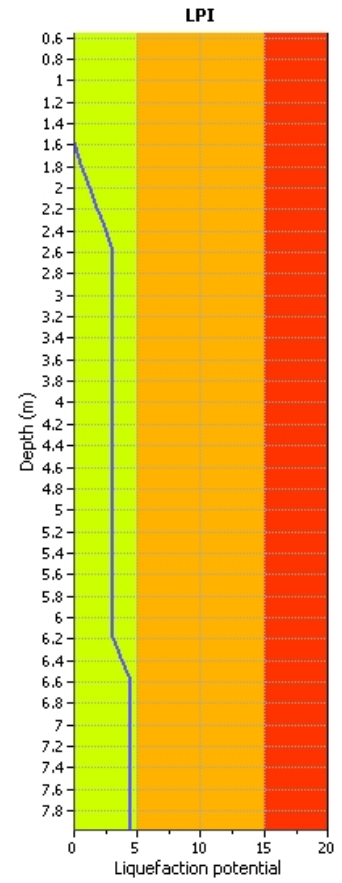
**Grafico 186 - 203010C013**



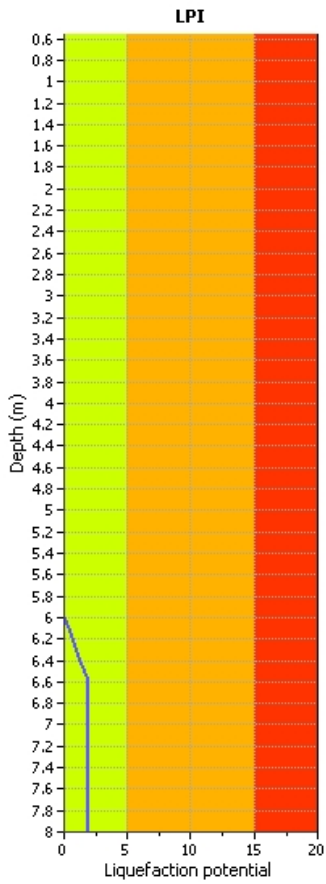
**Grafico 187 - 203010C014A**



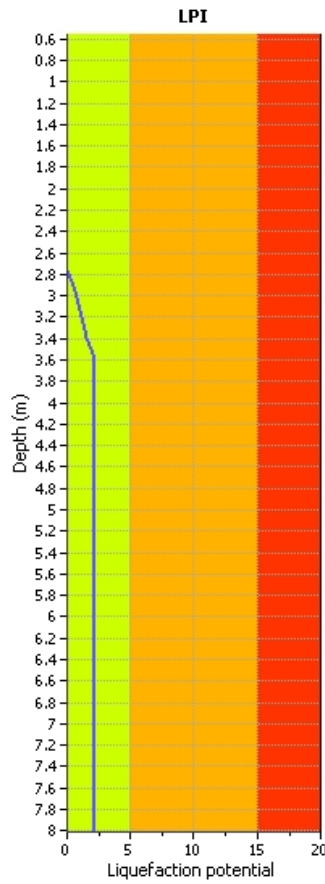
**Grafico 188 - 203010C014B**



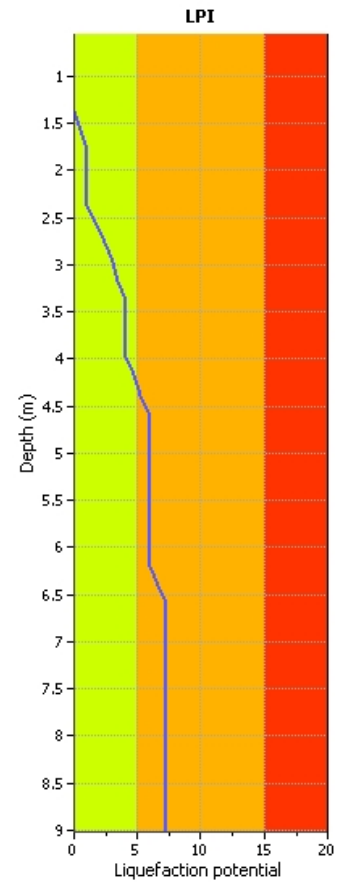
**Grafico 189 - 203010C015**



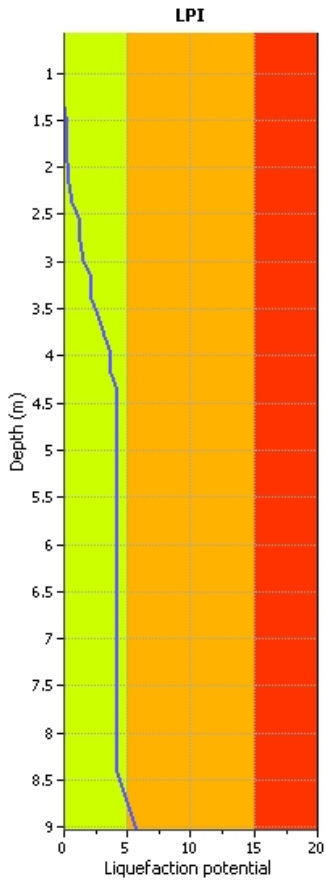
**Grafico 190 - 203010C016**



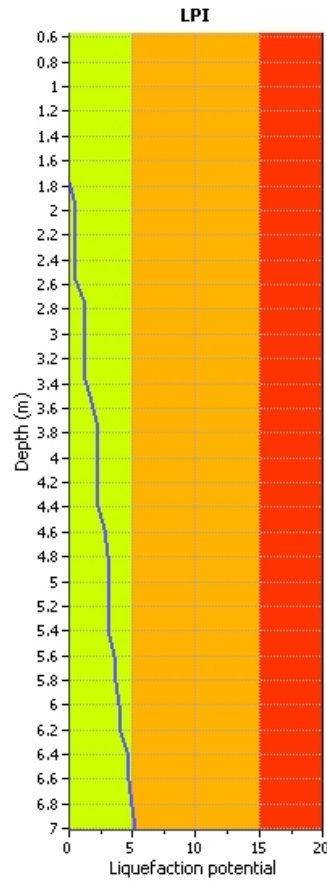
**Grafico 191 - 203010C017**



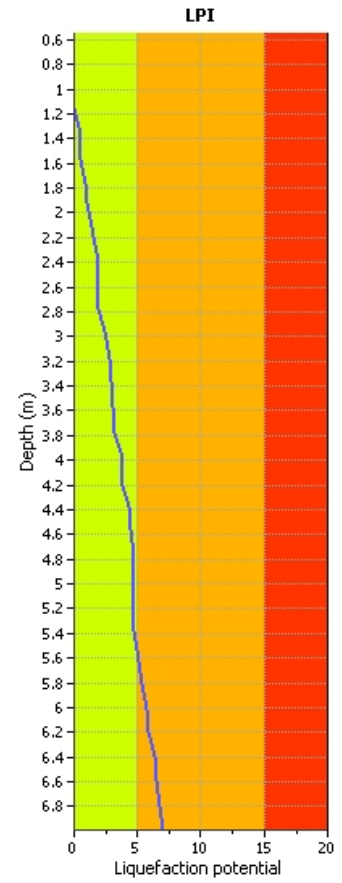
**Grafico 192 - 203010C018**



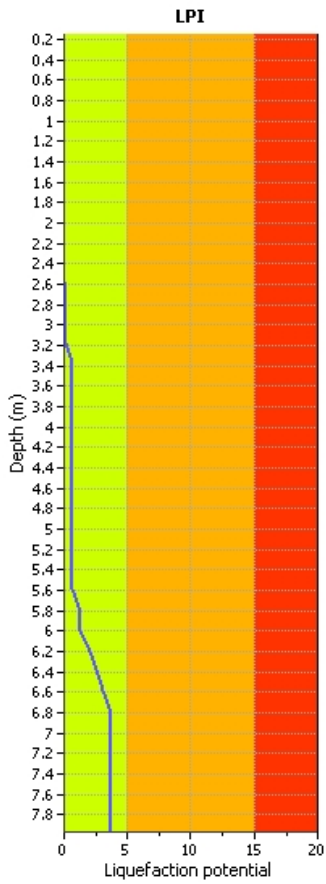
**Grafico 193 - 203010C019**



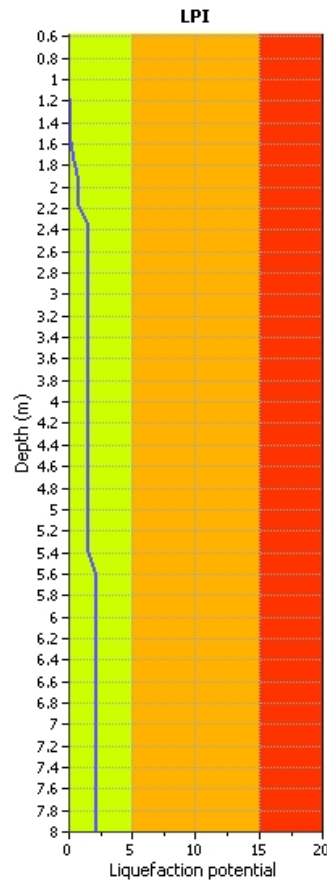
**Grafico 194 - 203010C020**



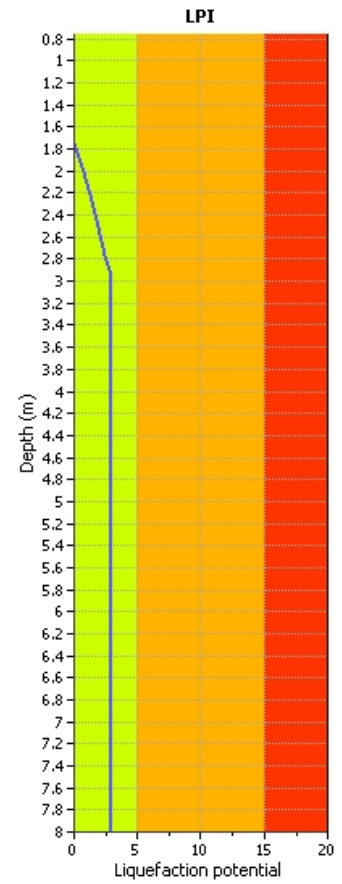
**Grafico 195 - 203010C021**



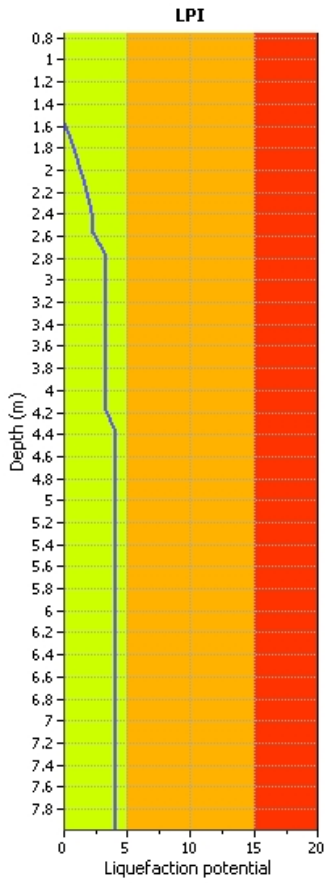
**Grafico 196 - 203010C022**



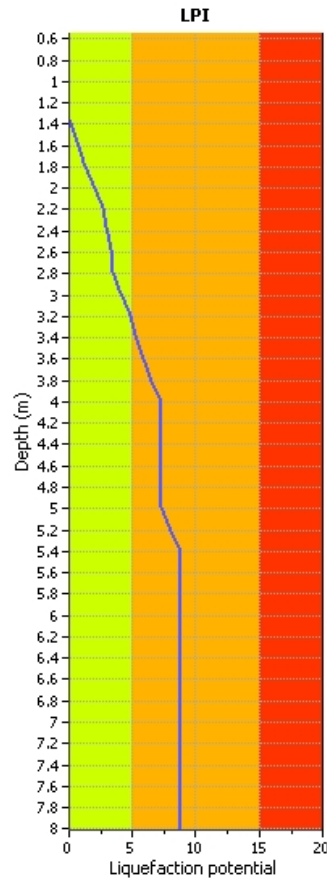
**Grafico 197 - 203010C023**



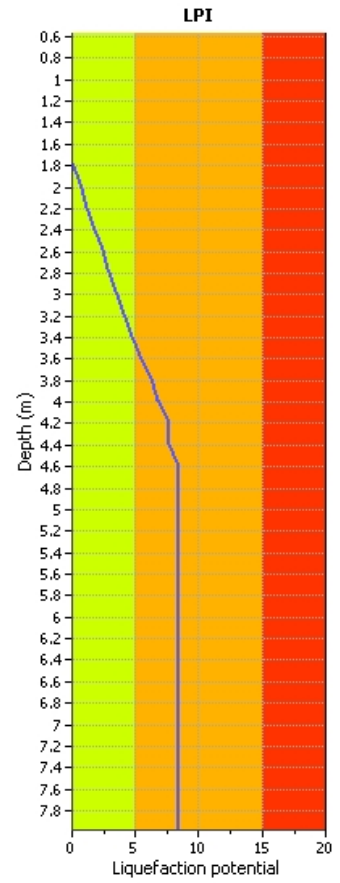
**Grafico 198 - 203010C024**



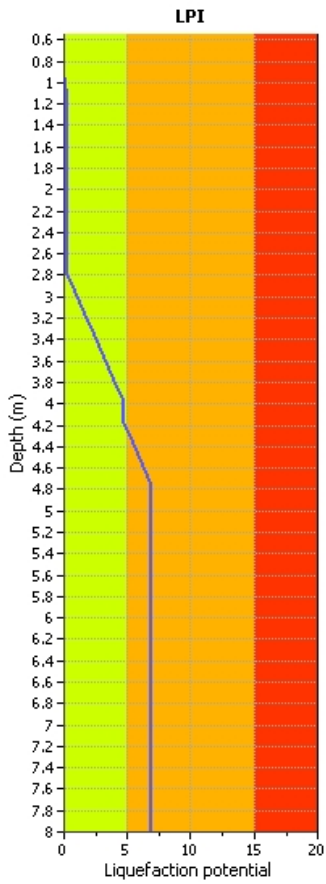
**Grafico 199 - 203010C025**



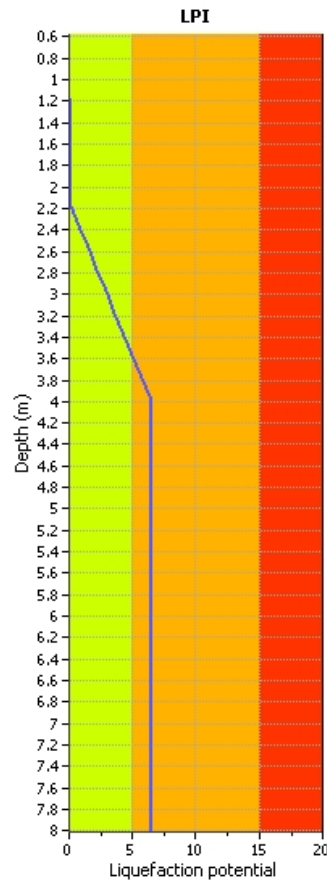
**Grafico 200 - 203010C026**



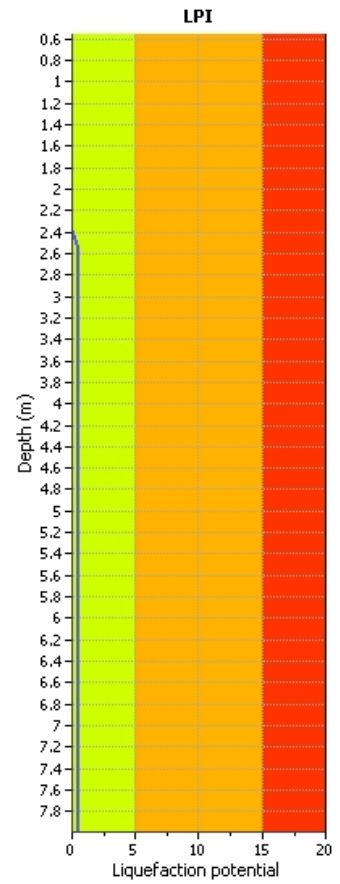
**Grafico 201 - 203010C027**



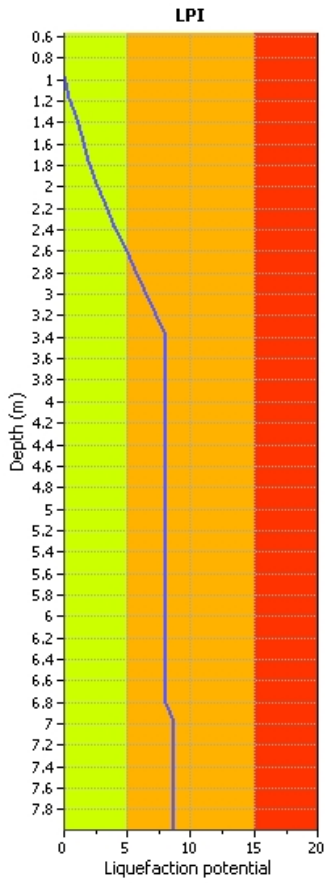
**Grafico 202 - 203010C028**



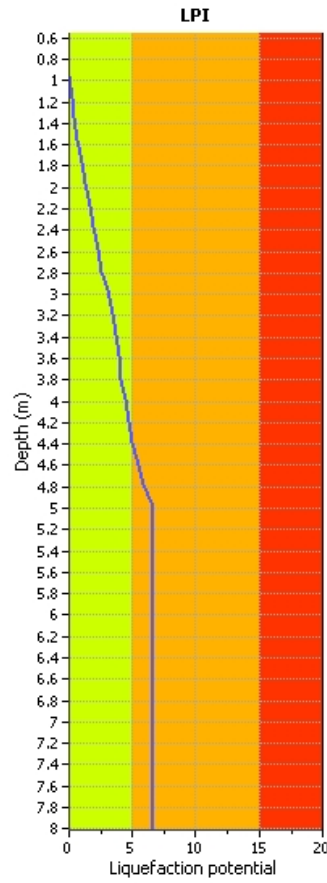
**Grafico 203 - 203010C029**



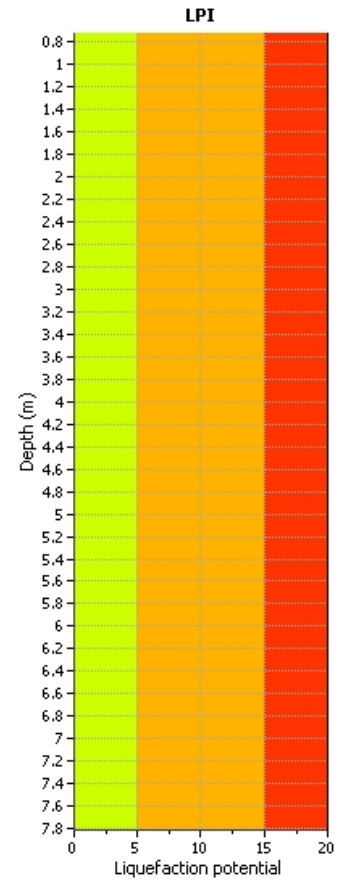
**Grafico 204 - 203010C030**



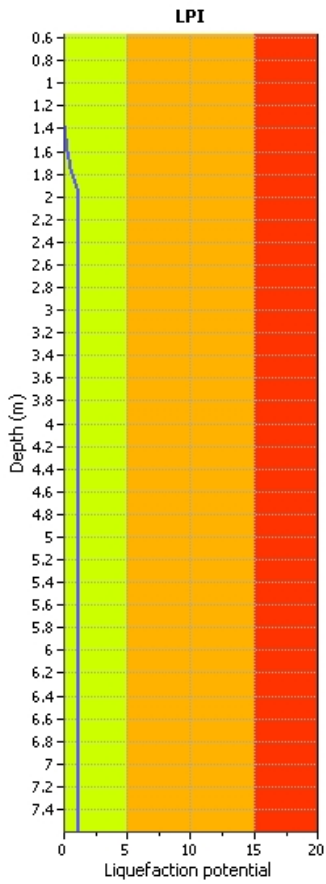
**Grafico 205 - 203010C031**



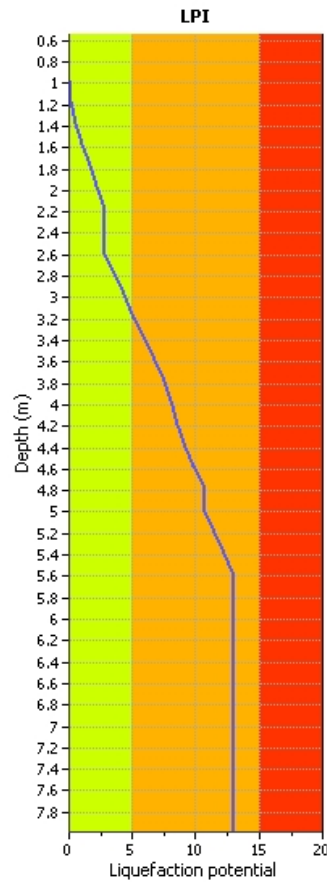
**Grafico 206 - 203010C032**



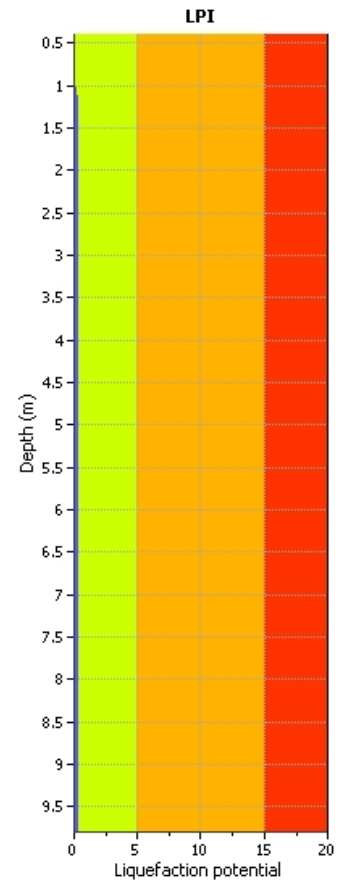
**Grafico 207 - 203010C033**



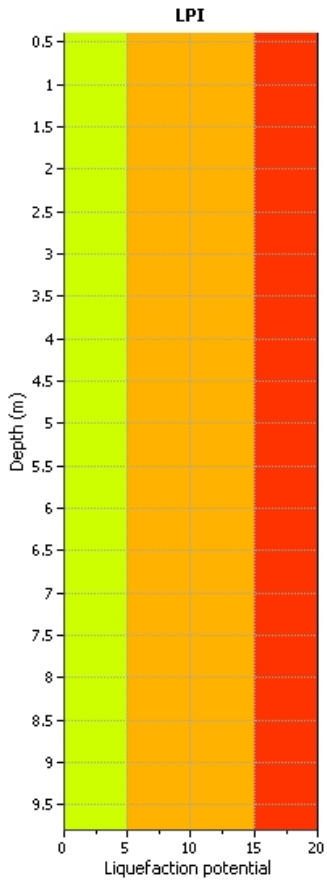
**Grafico 208 - 203010C034**



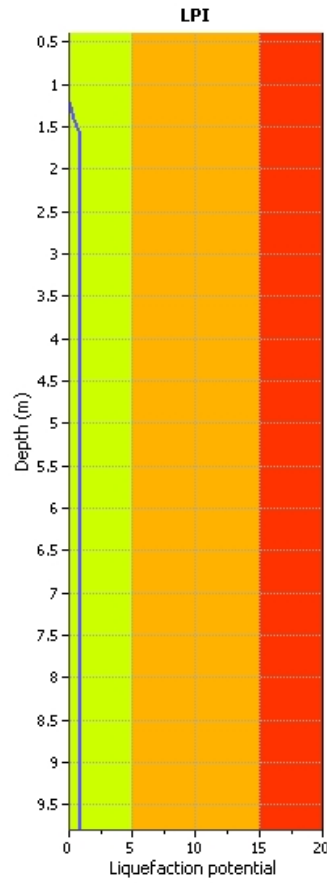
**Grafico 209 - 203010C035**



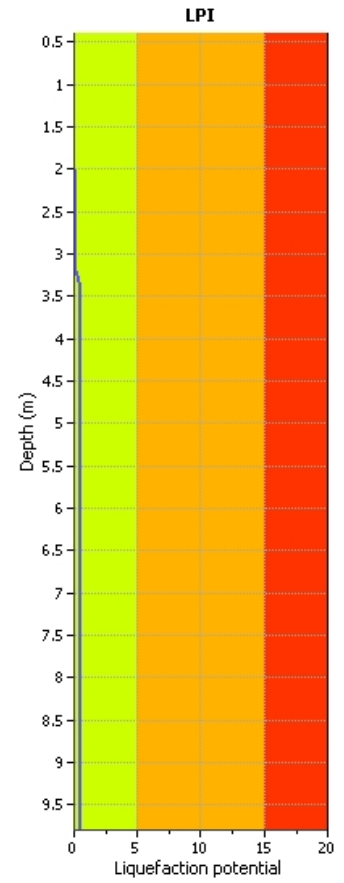
**Grafico 210 - 203010C036**



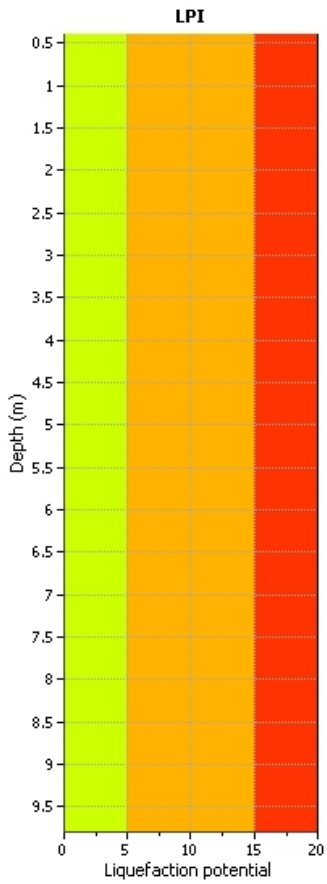
**Grafico 211 - 203010C037**



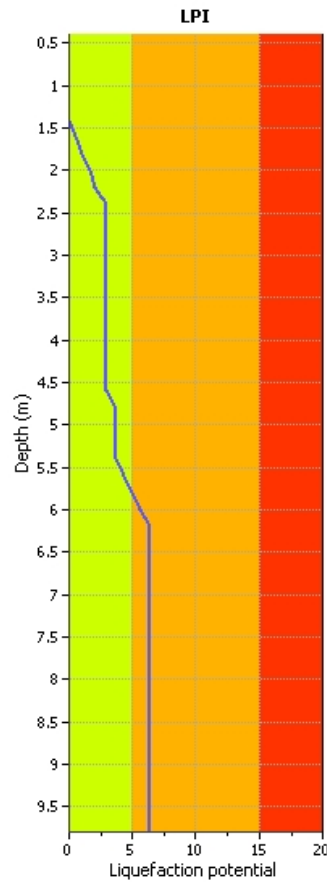
**Grafico 212 - 203010C038**



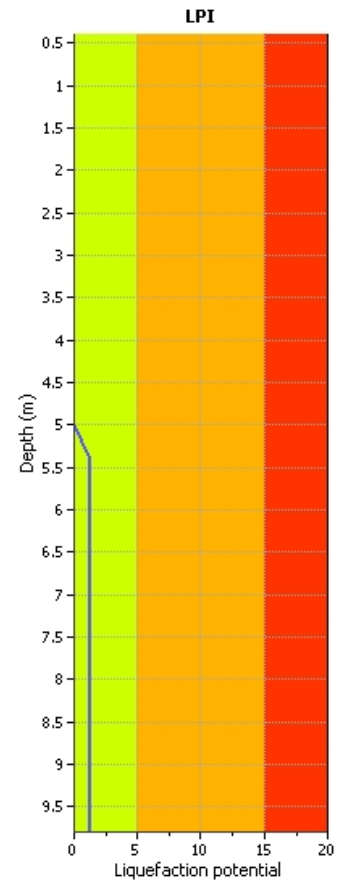
**Grafico 213 - 203010C039**



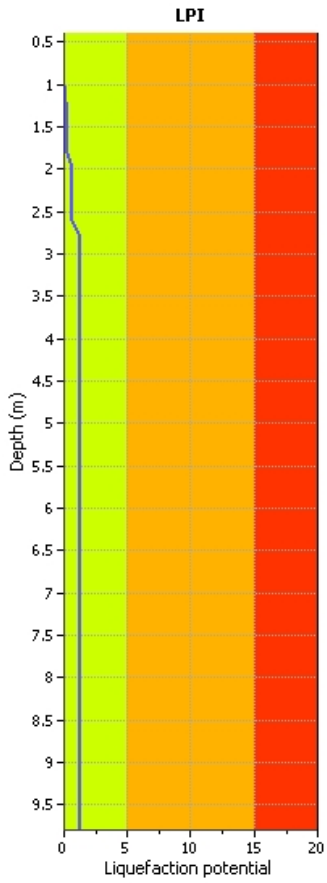
**Grafico 214 - 203010C040**



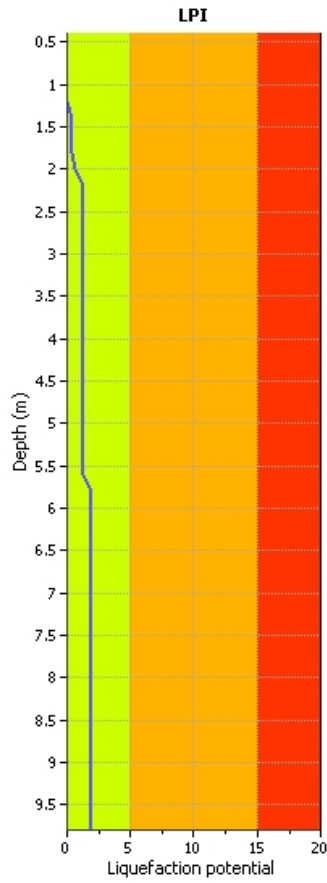
**Grafico 215 - 203010C041**



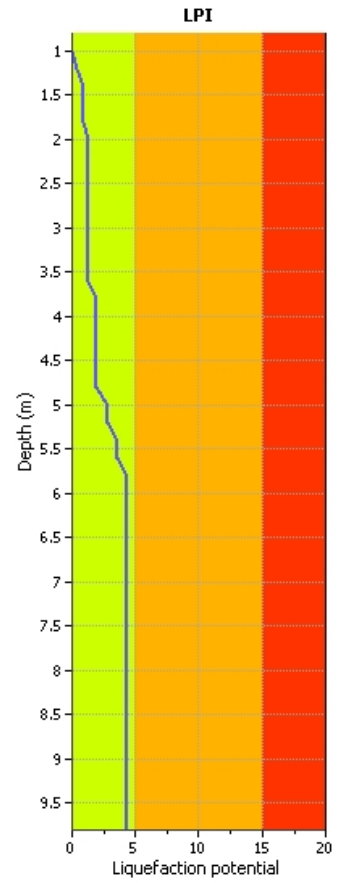
**Grafico 216 - 203010C042**



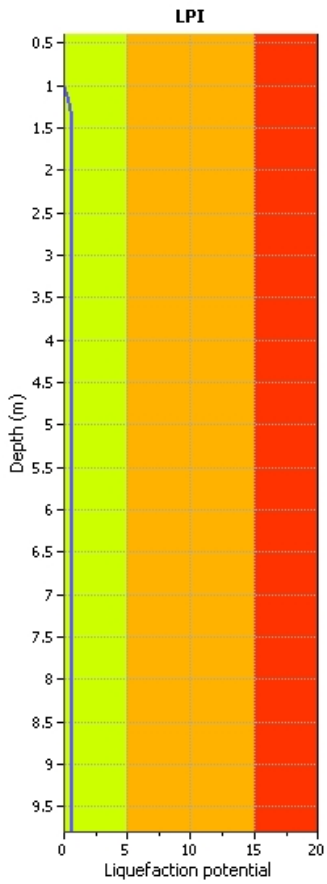
**Grafico 217 - 203010C043**



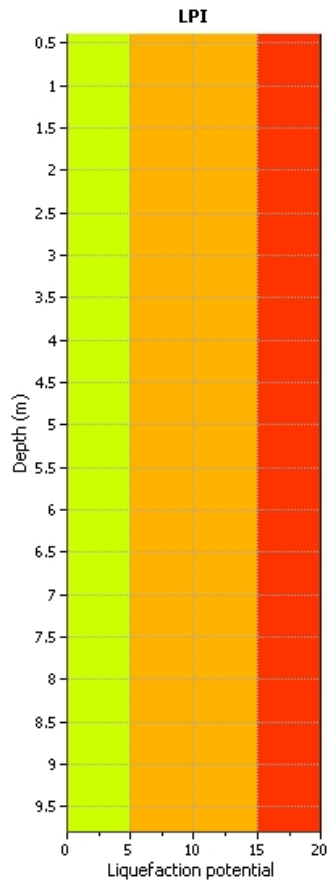
**Grafico 218 - 203010C044**



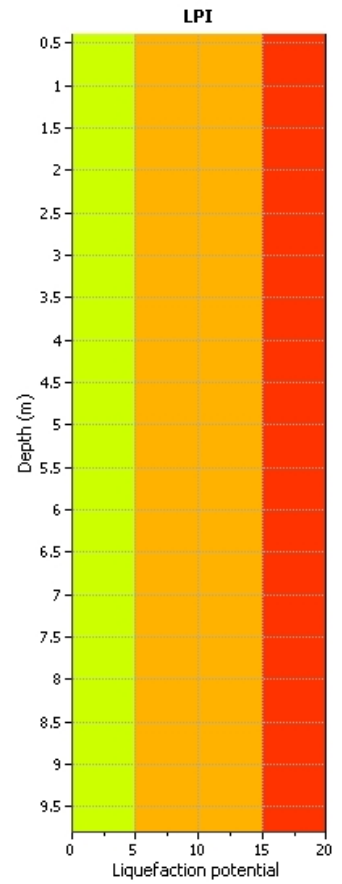
**Grafico 219 - 203010C045**



**Grafico 220 - 203010C046**

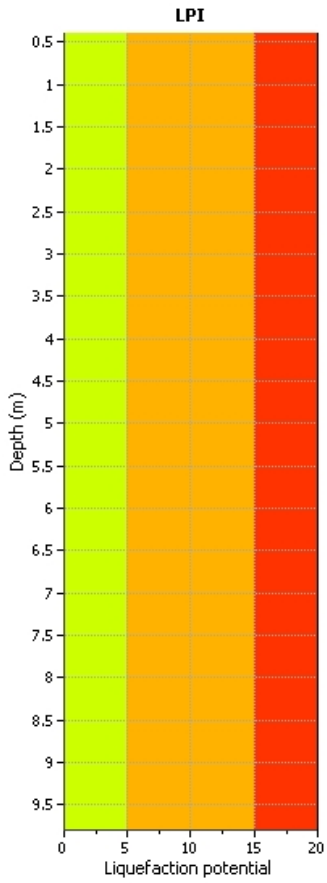


**Grafico 221 - 203010C047**

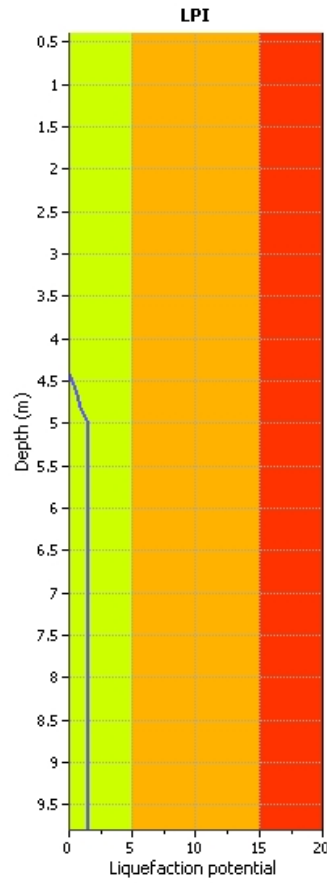


**Grafico 222 - 203010C048**

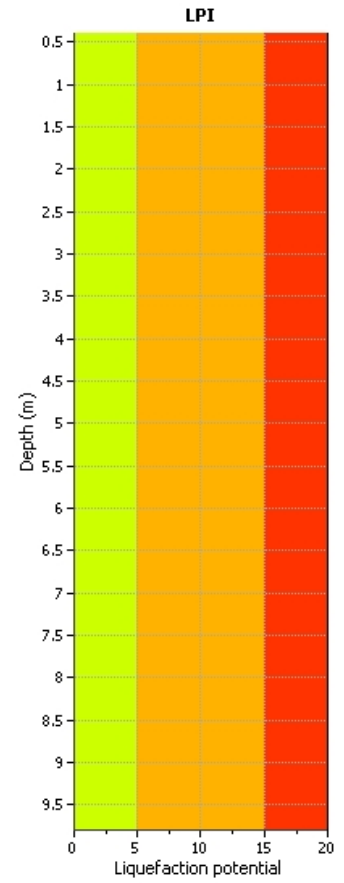




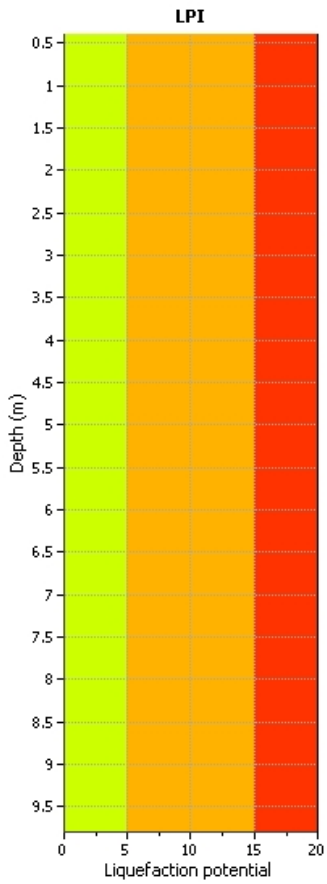
**Grafico 223 - 203010C049**



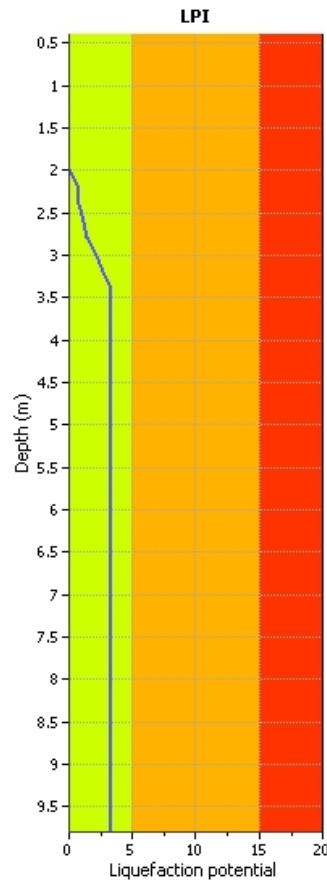
**Grafico 224 - 203010C050**



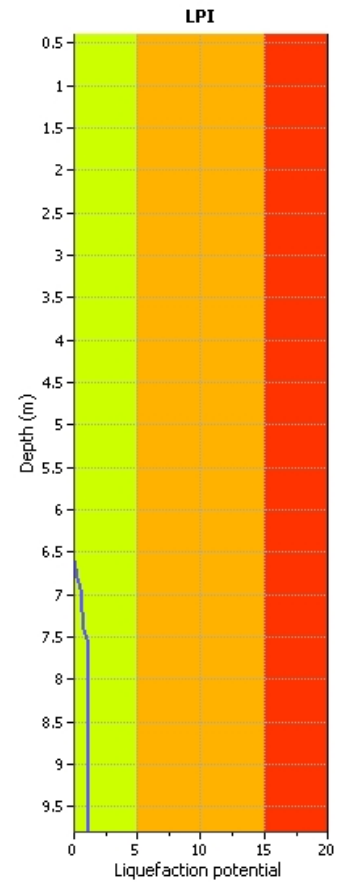
**Grafico 225 - 203010C051**



**Grafico 226 - 203010C052**

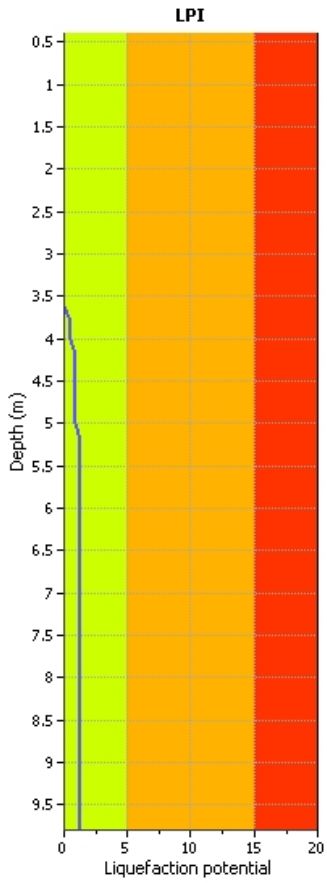


**Grafico 227 - 203010C053**

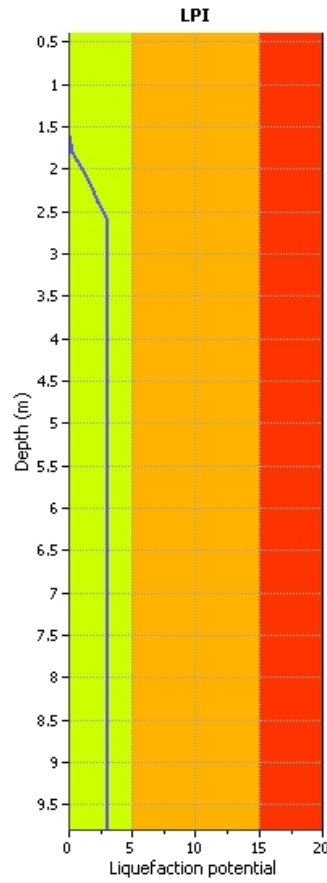


**Grafico 228 - 203010C054**

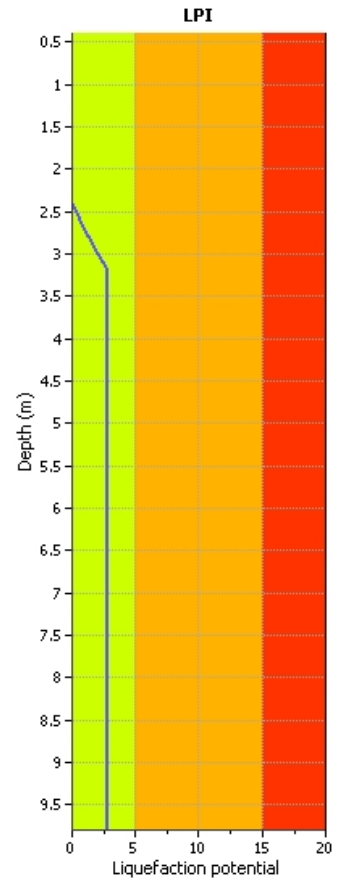




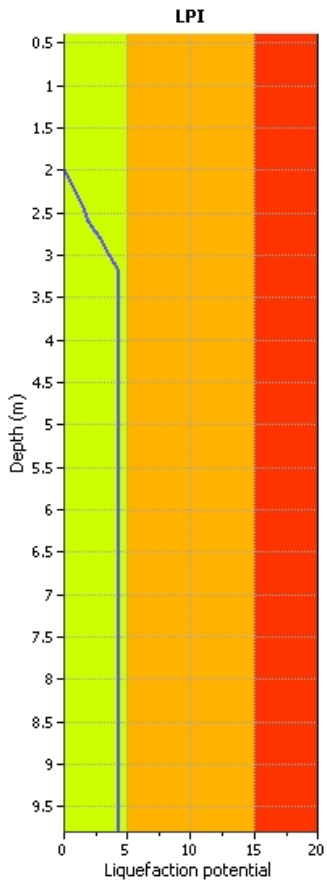
**Grafico 229 - 203010C055**



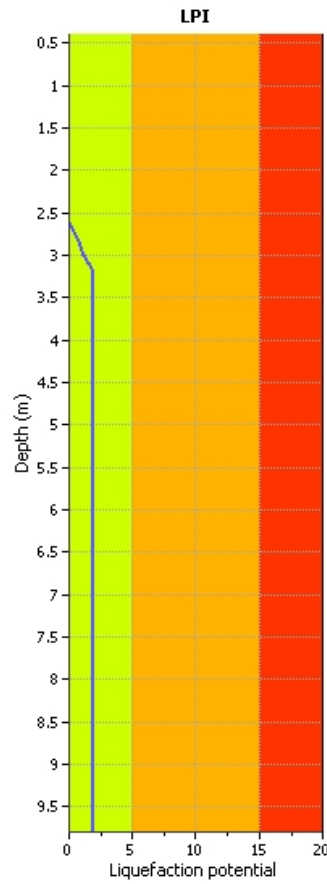
**Grafico 230 - 203010C056**



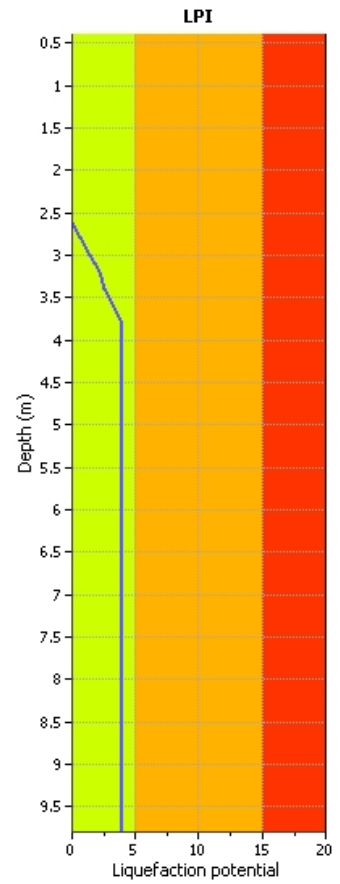
**Grafico 231 - 203010C057**



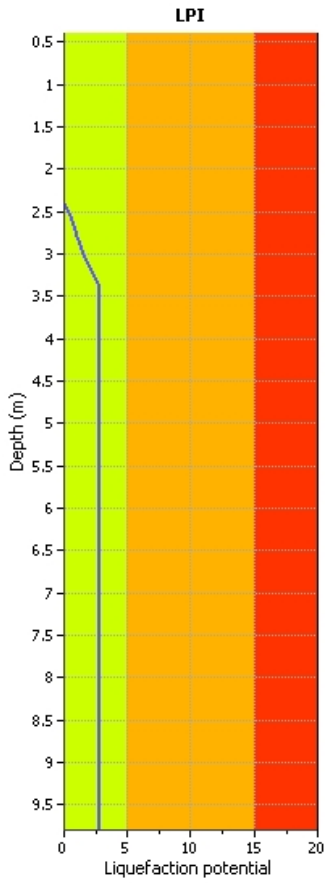
**Grafico 232 - 203010C058**



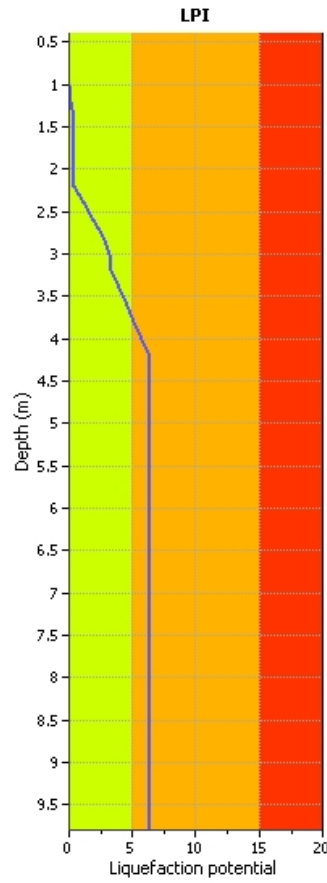
**Grafico 233 - 203010C059**



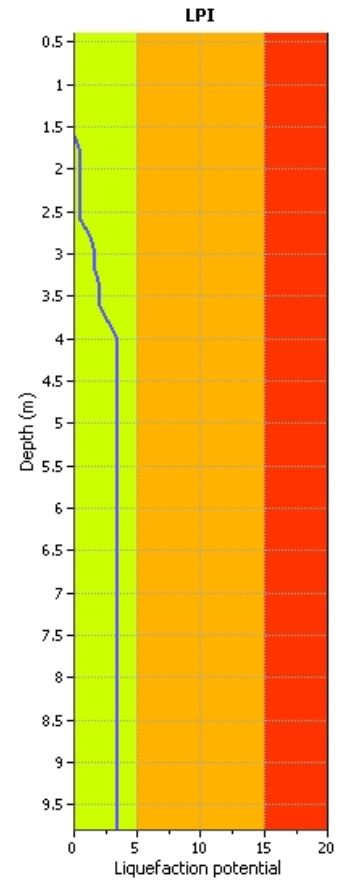
**Grafico 234 - 203010C060**



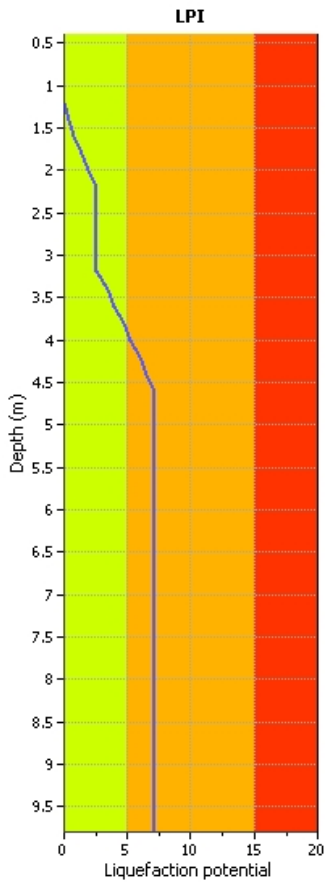
**Grafico 235 - 203010C061**



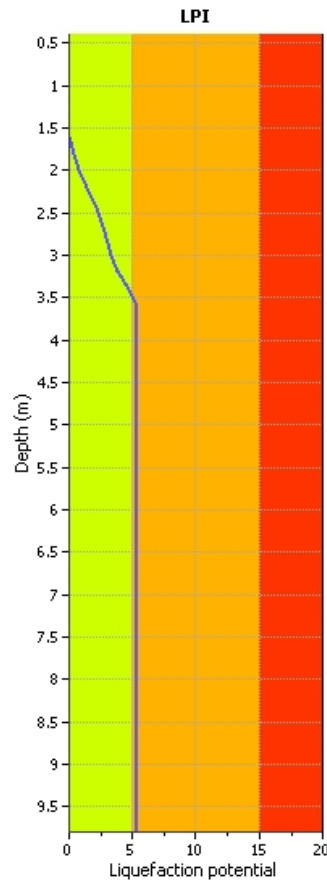
**Grafico 236 - 203010C062**



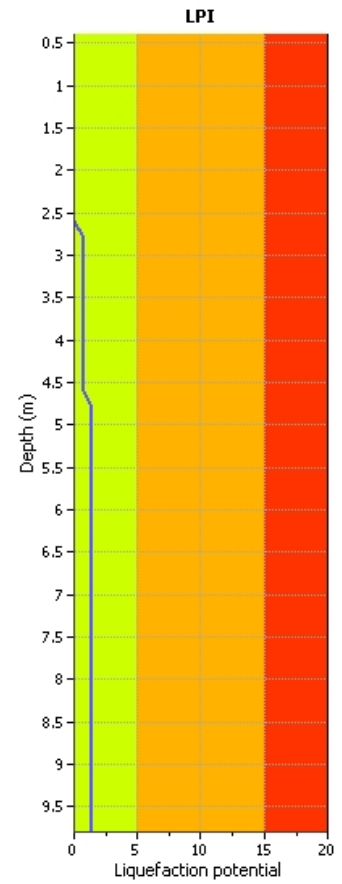
**Grafico 237 - 203010C063**



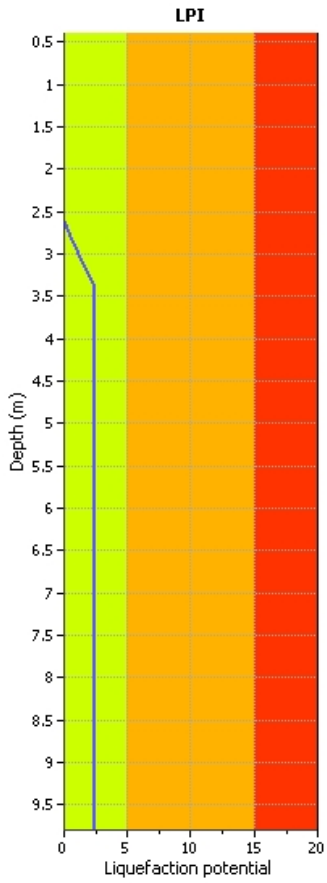
**Grafico 238 - 203010C064**



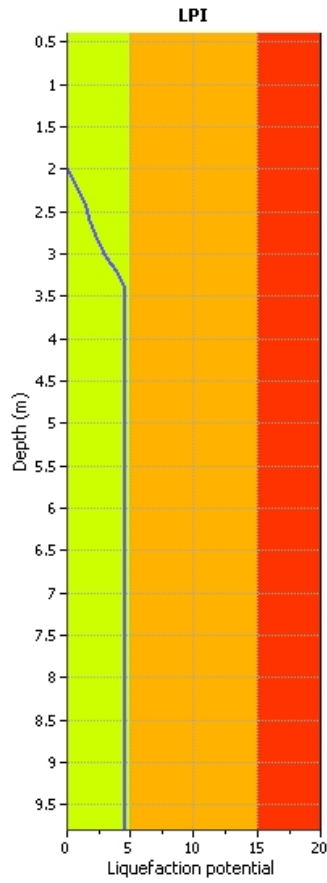
**Grafico 239 - 203010C065**



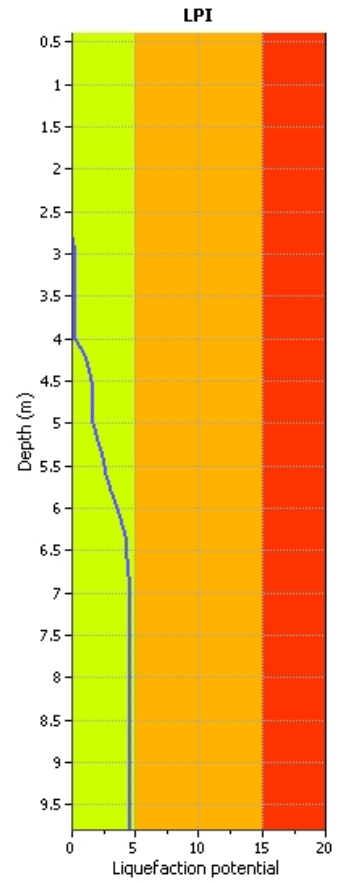
**Grafico 240 - 203010C066**



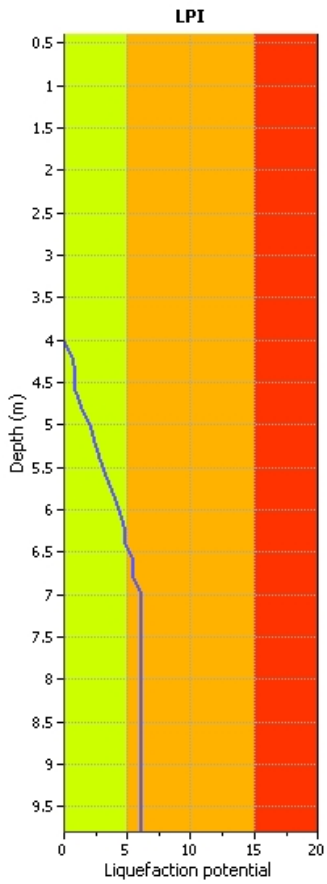
**Grafico 241 - 203010C067**



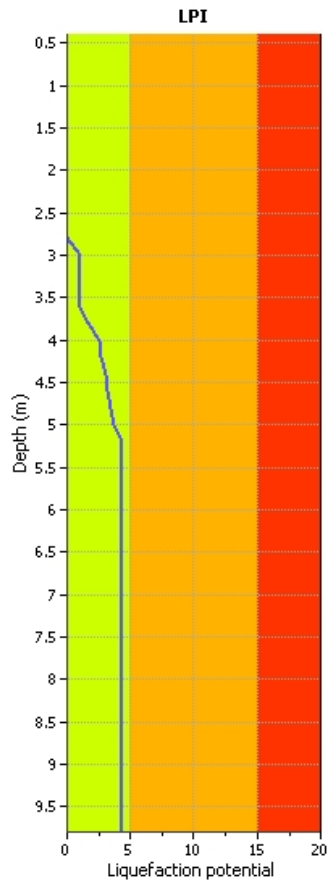
**Grafico 242 - 203010C068**



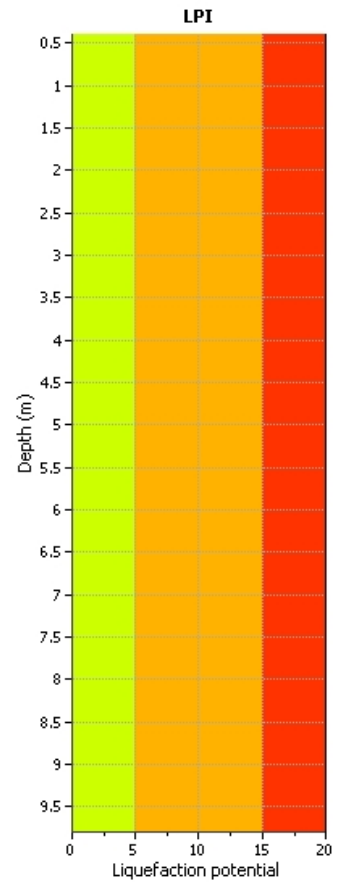
**Grafico 243 - 203010C069**



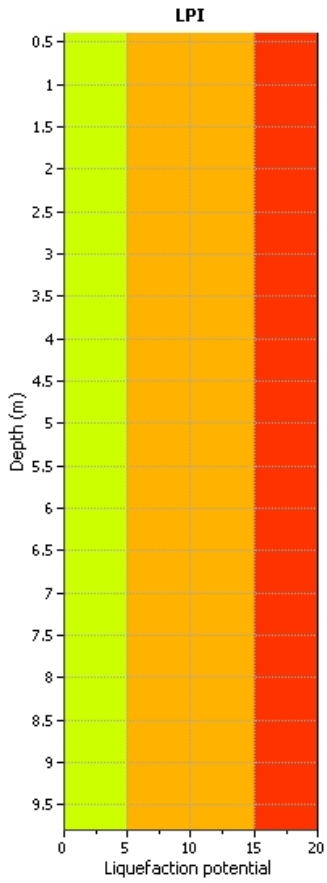
**Grafico 244 - 203010C070**



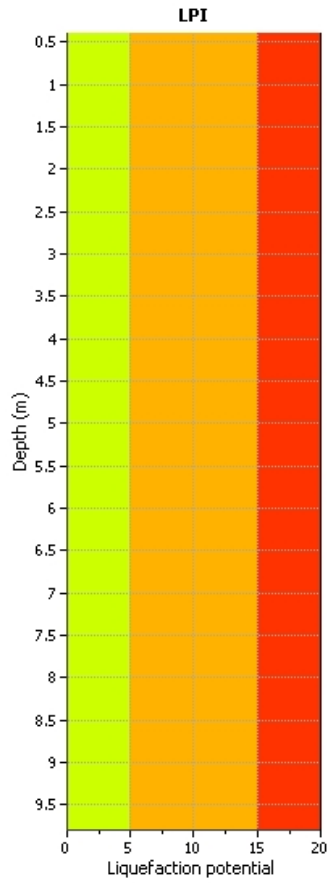
**Grafico 245 - 203010C071**



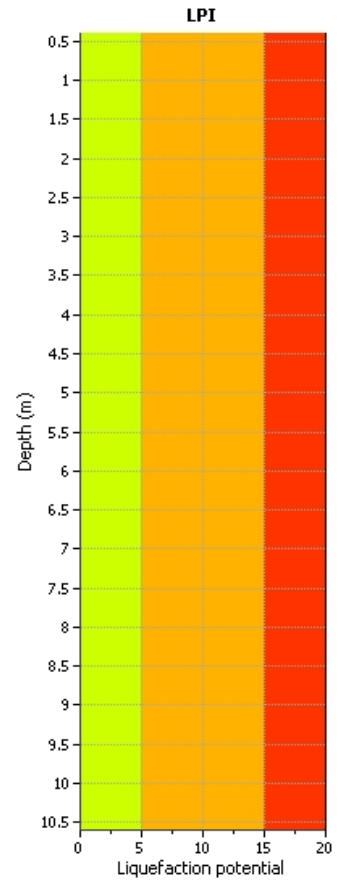
**Grafico 246 - 203010C072**



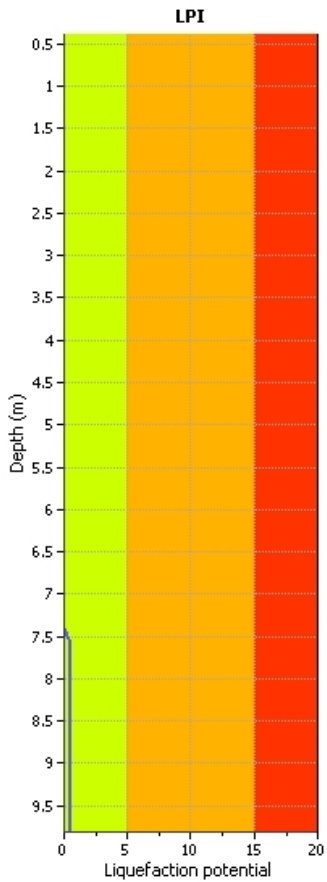
**Grafico 247 - 203010C073**



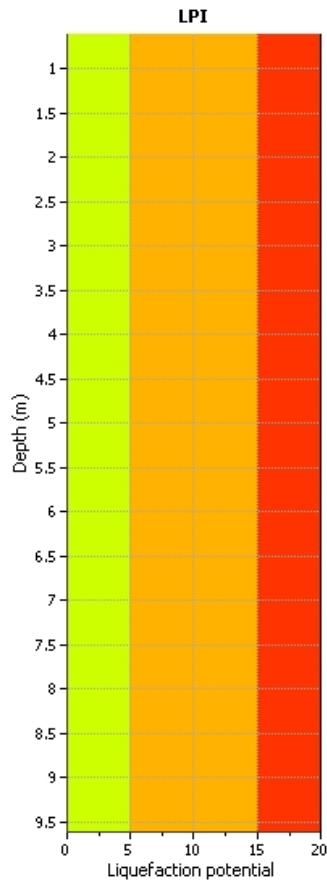
**Grafico 248 - 203010C074**



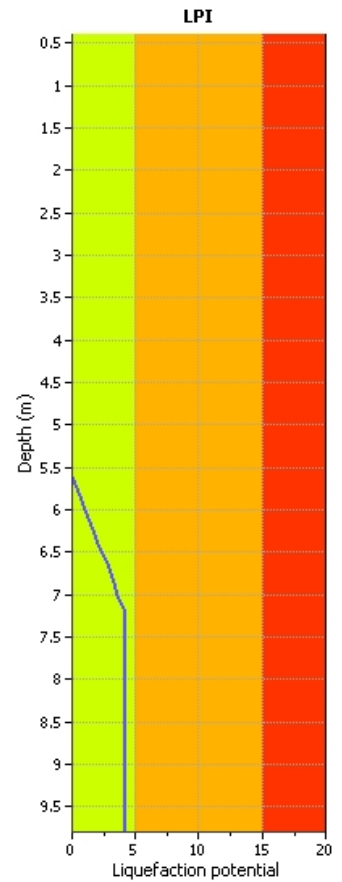
**Grafico 249 - 203010C075**



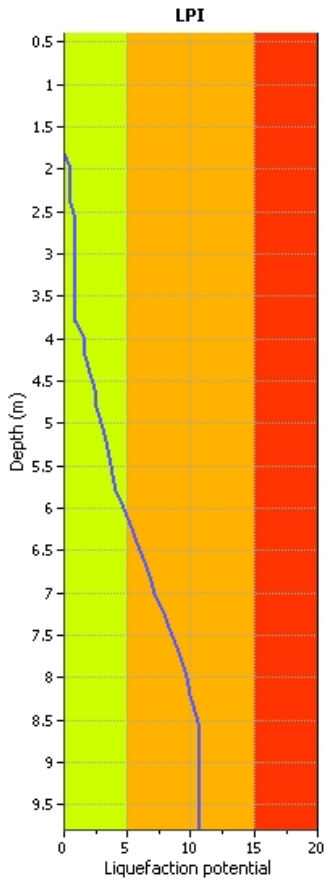
**Grafico 250 - 203010C076**



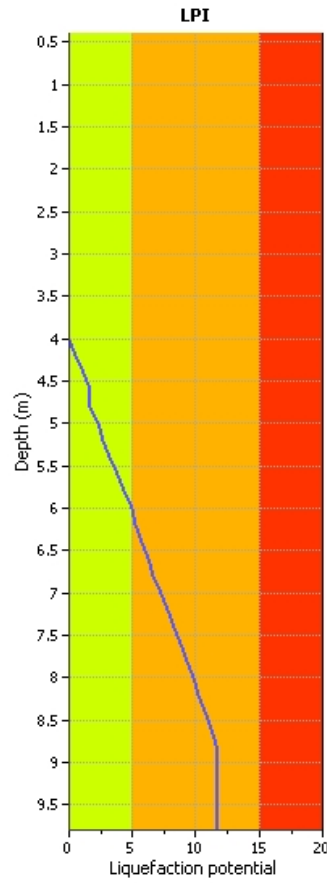
**Grafico 251 - 203010C077**



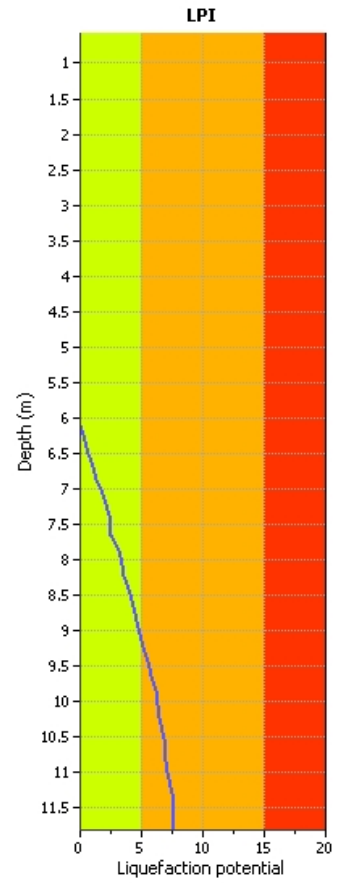
**Grafico 252 - 203010C078**



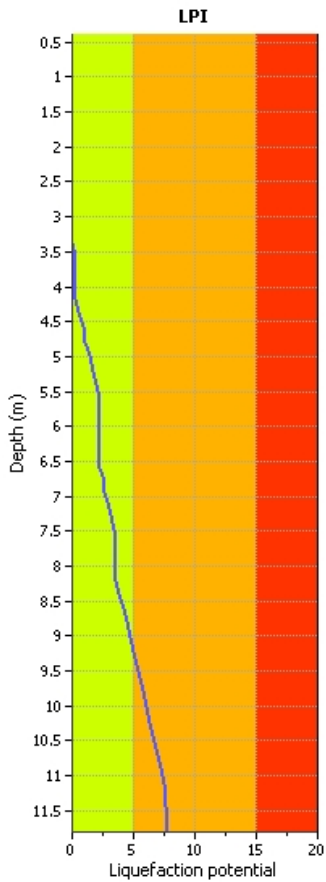
**Grafico 253 - 203010C079A**



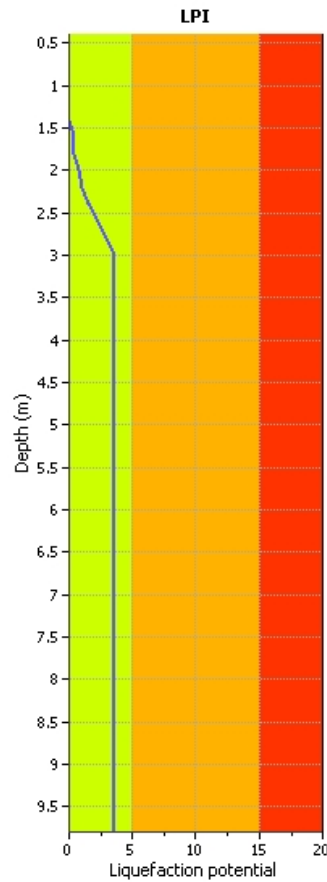
**Grafico 254 - 203010C079B**



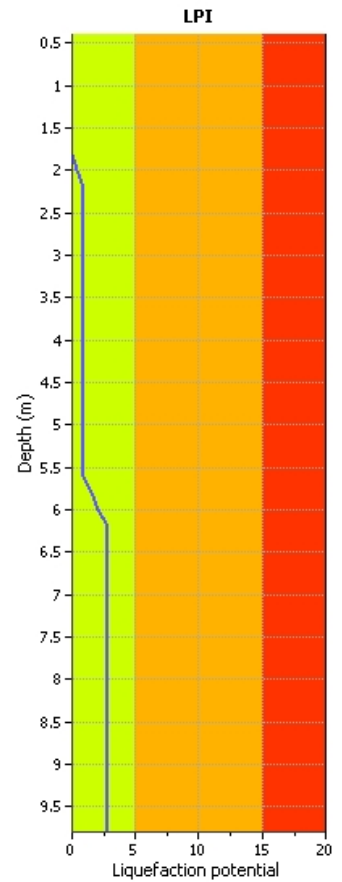
**Grafico 255 - 203010C079C**



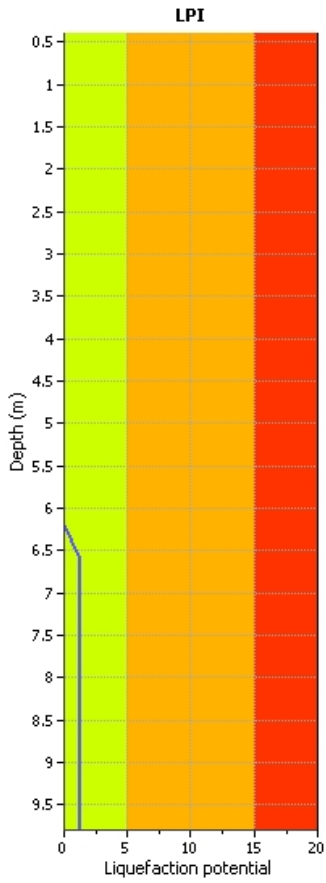
**Grafico 256 - 203010C079D**



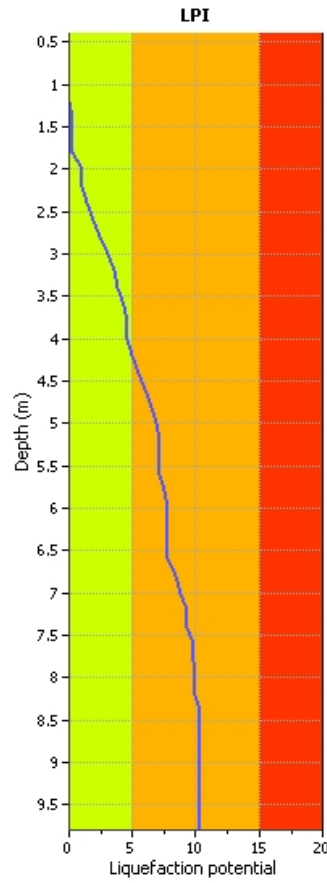
**Grafico 257 - 203010C080**



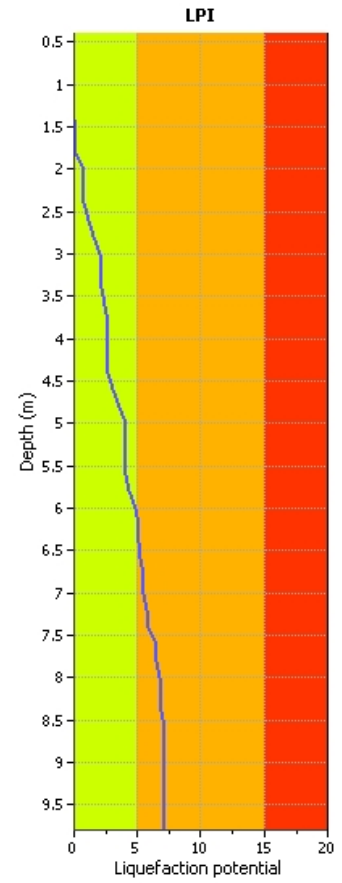
**Grafico 258 - 203010C081**



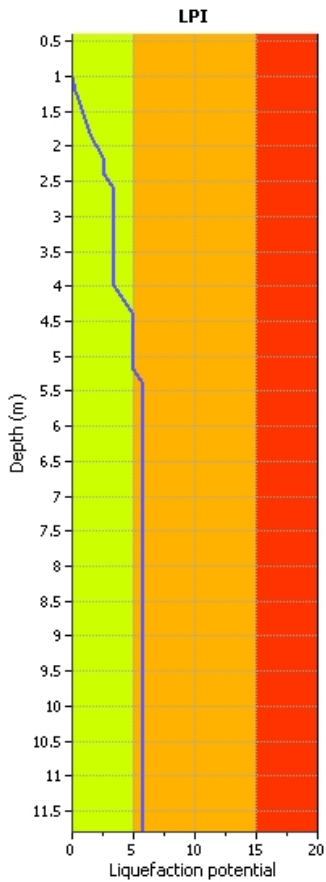
**Grafico 259 - 203010C082**



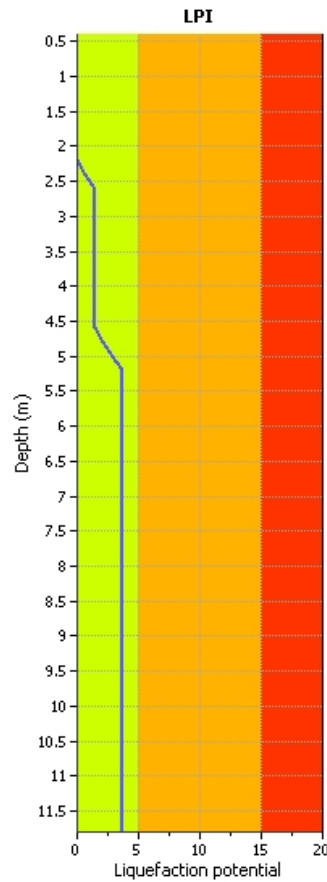
**Grafico 260 - 203010C083**



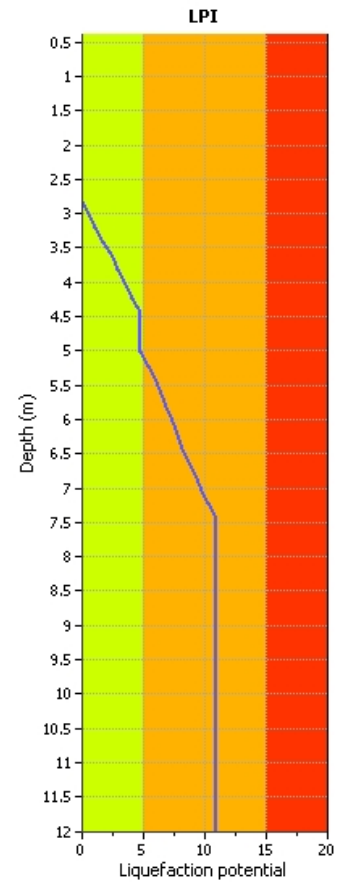
**Grafico 261 - 203010C084**



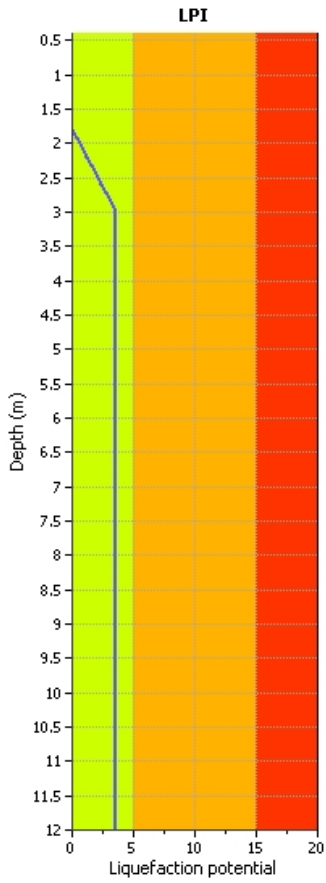
**Grafico 262 - 203010C085**



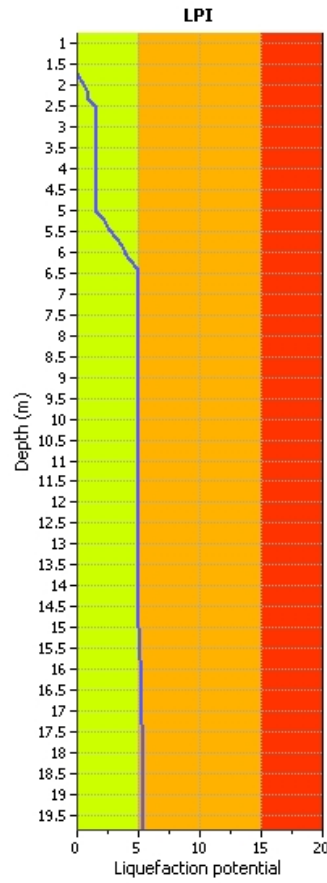
**Grafico 263 - 203010C086**



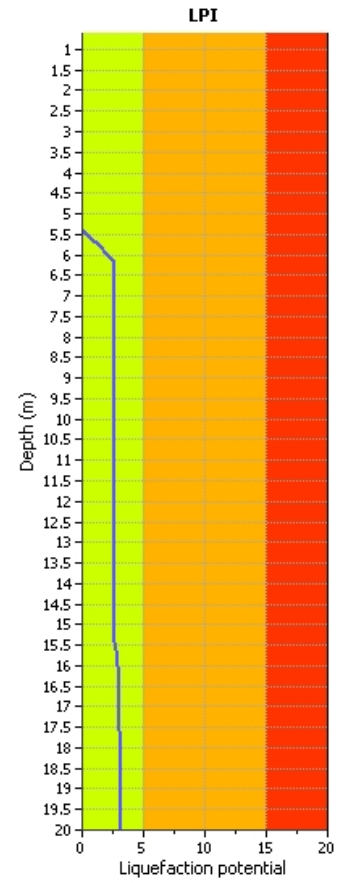
**Grafico 264 - 203010C087**



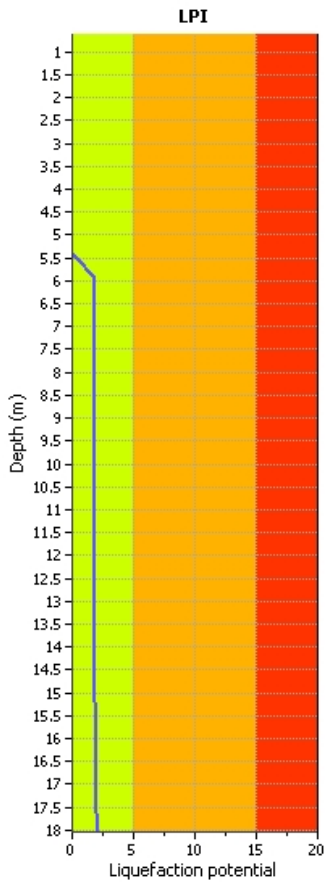
**Grafico 265 - 203010C094**



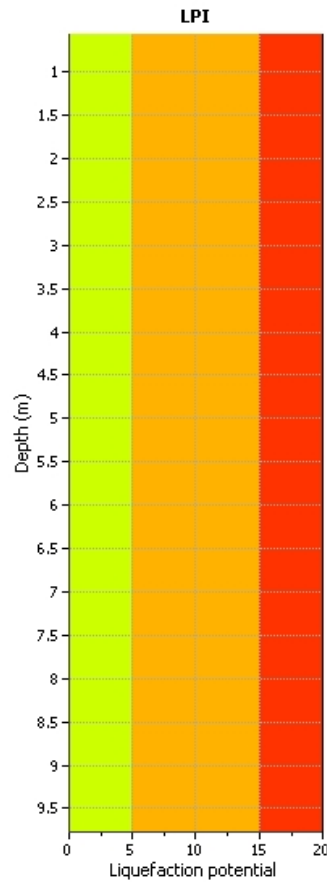
**Grafico 266 - 203010C101**



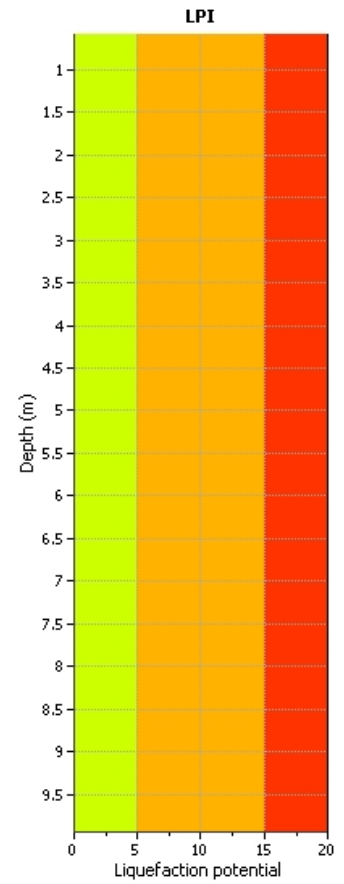
**Grafico 267 - 203010C102**



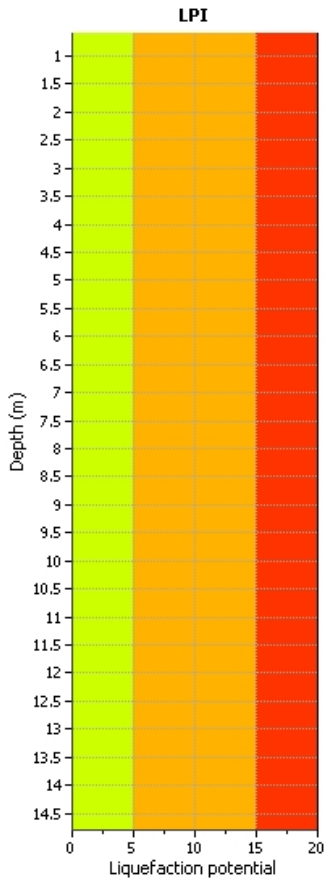
**Grafico 268 - 203010C103**



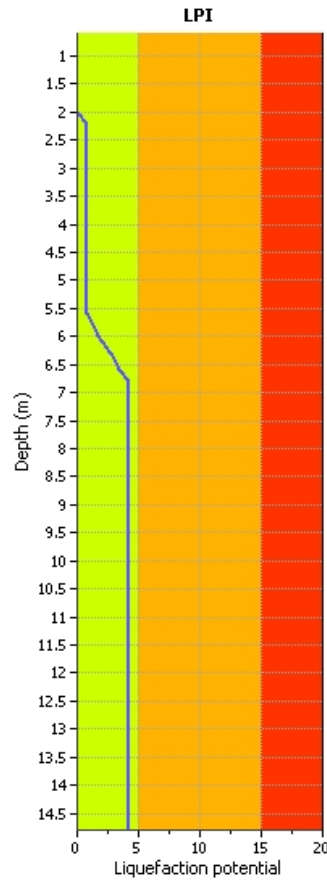
**Grafico 269 - 203010C104**



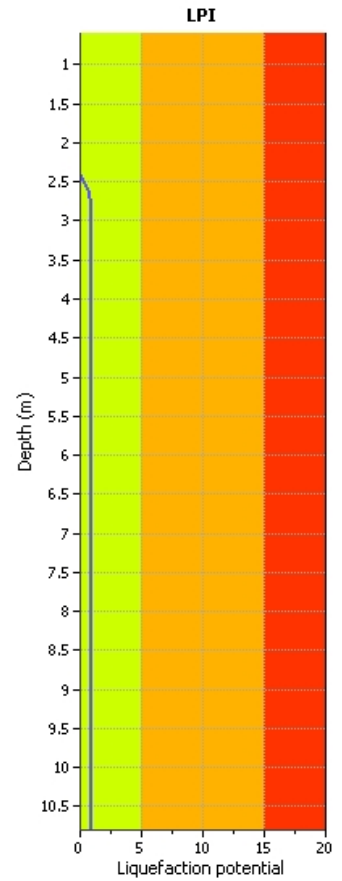
**Grafico 270 - 203010C105**



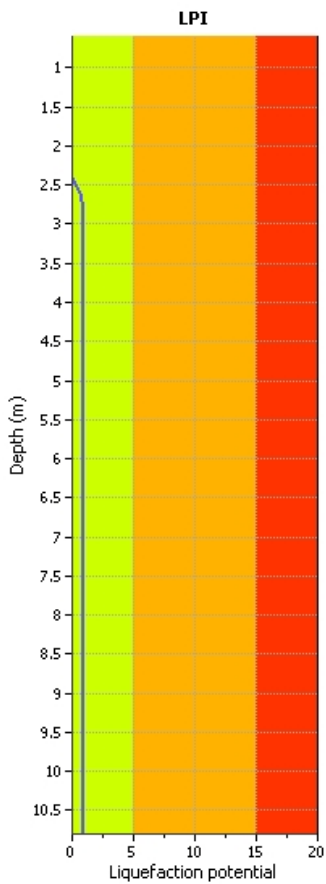
**Grafico 271 - 203010C106**



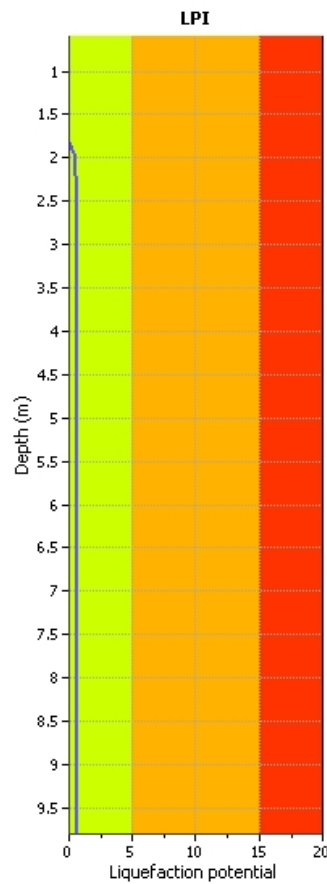
**Grafico 272 - 203010C107**



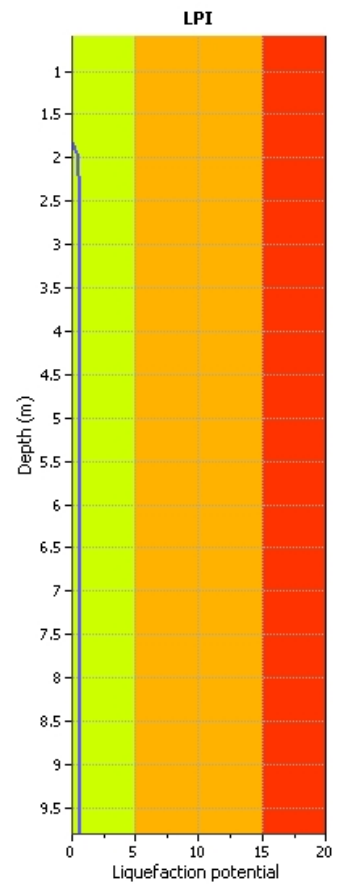
**Grafico 273 - 203010C108**



**Grafico 274 - 203010C109**

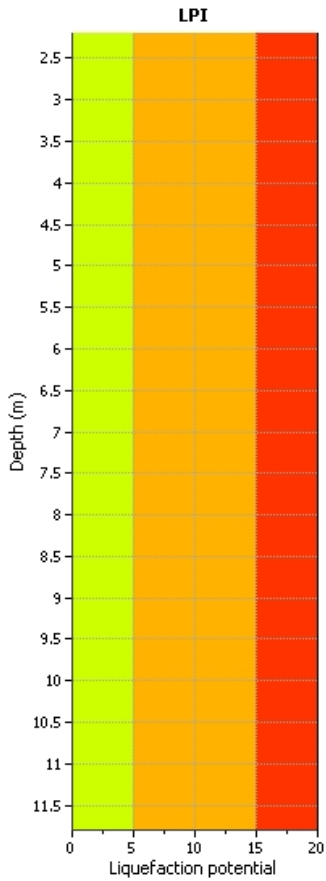


**Grafico 275 - 203010C110**

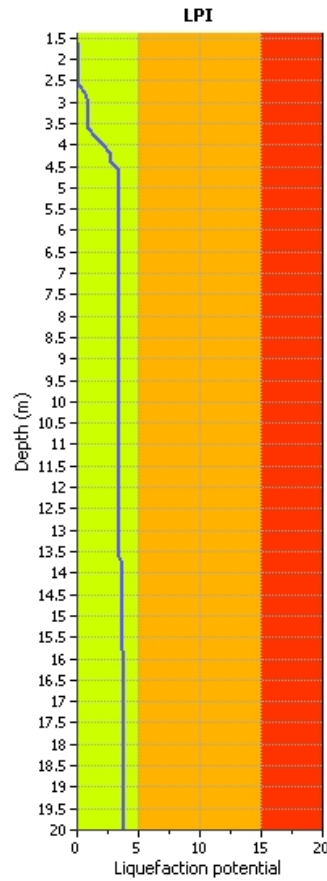


**Grafico 276 - 203010C111**

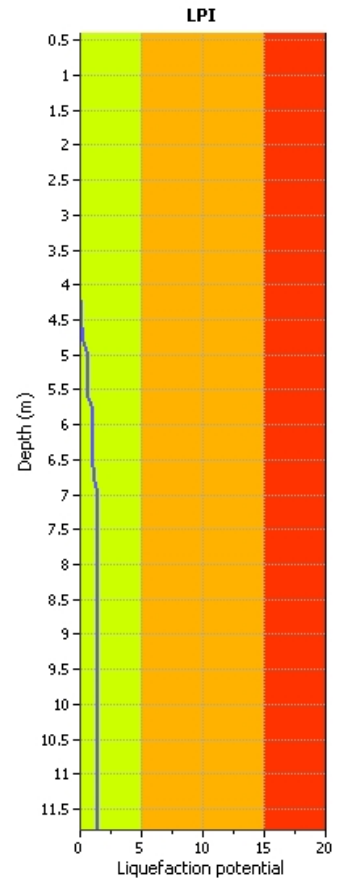




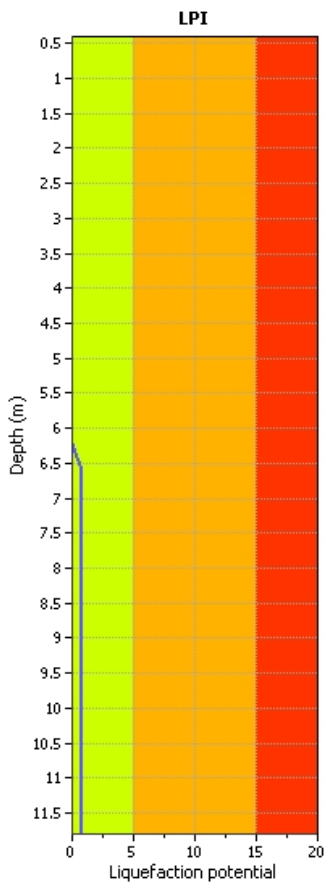
**Grafico 277 - 203010C112**



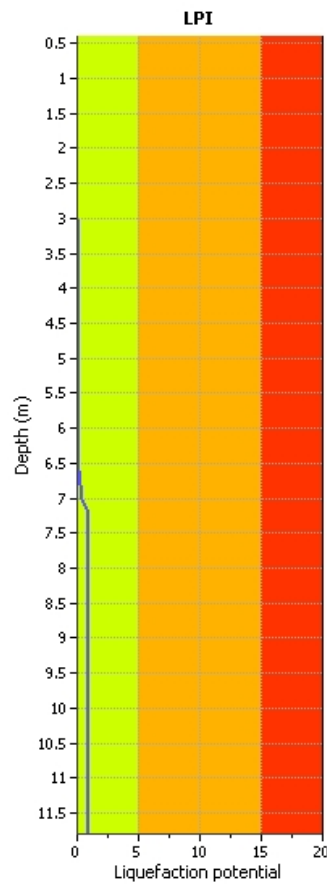
**Grafico 278 - 203010C113**



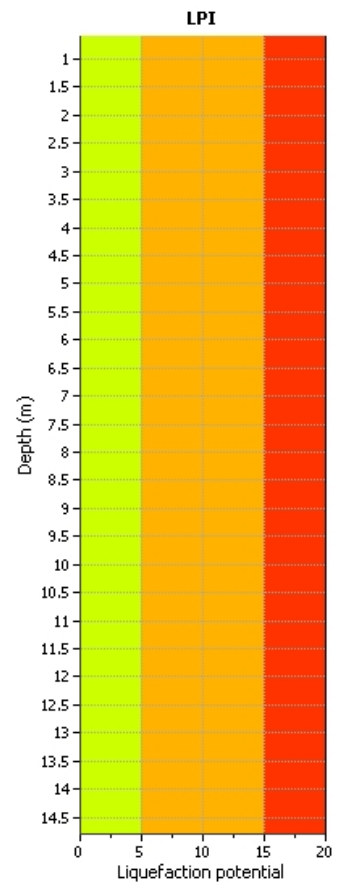
**Grafico 279 - 203010C114**



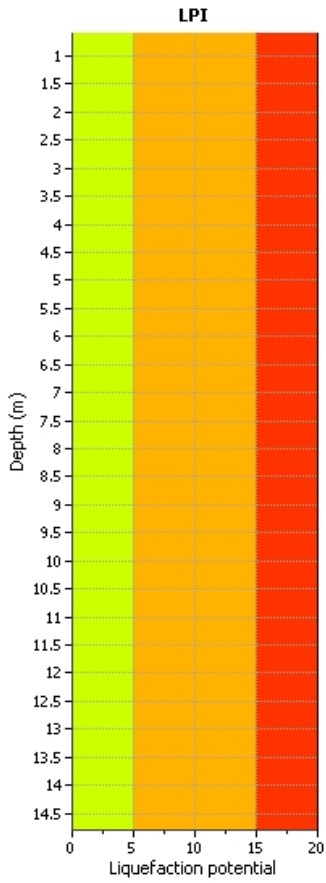
**Grafico 280 - 203010C115**



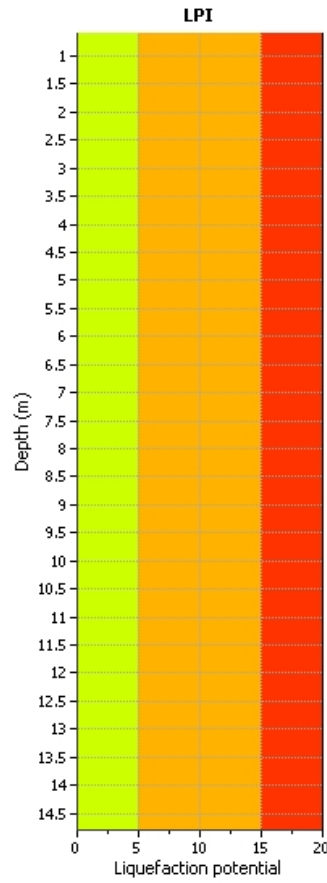
**Grafico 281 - 203010C116**



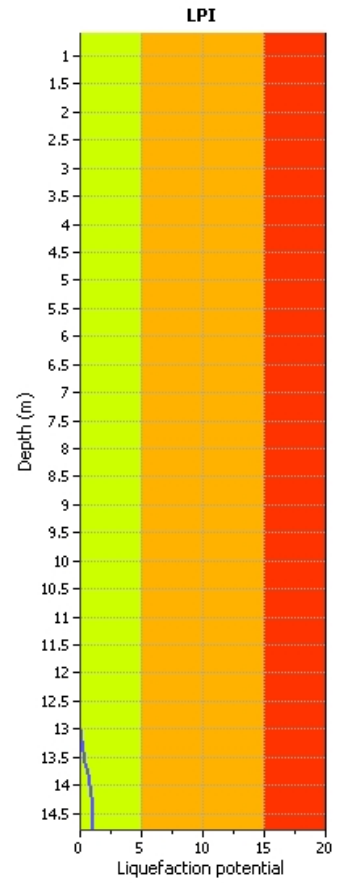
**Grafico 282 - 203010C117**



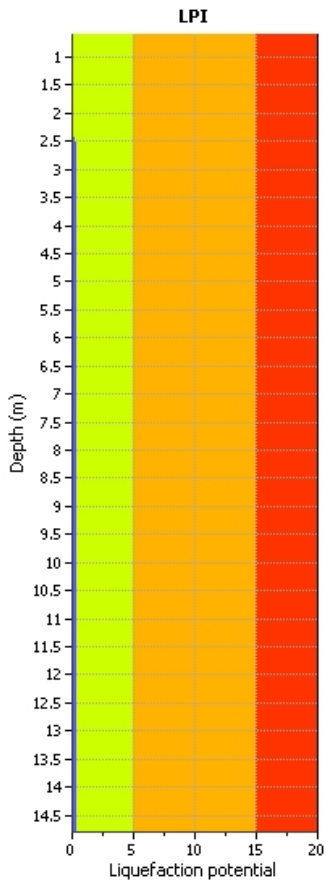
**Grafico 283 - 203010C118**



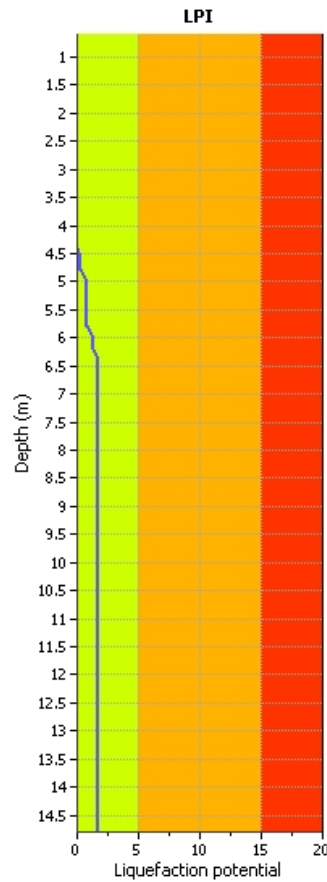
**Grafico 284 - 203010C119**



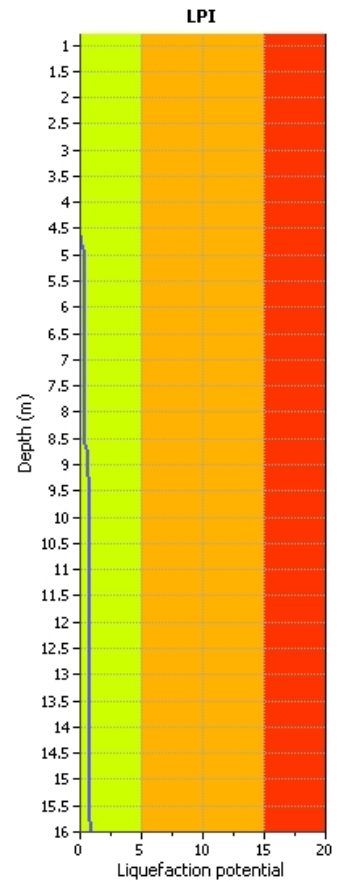
**Grafico 285 - 203010C120**



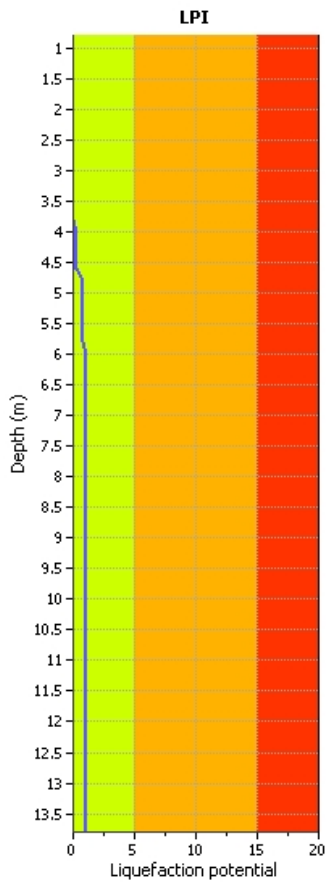
**Grafico 286 - 203010C121**



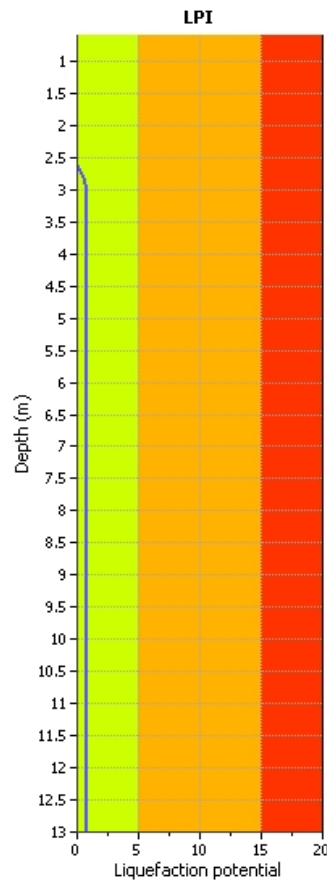
**Grafico 287 - 203010C122**



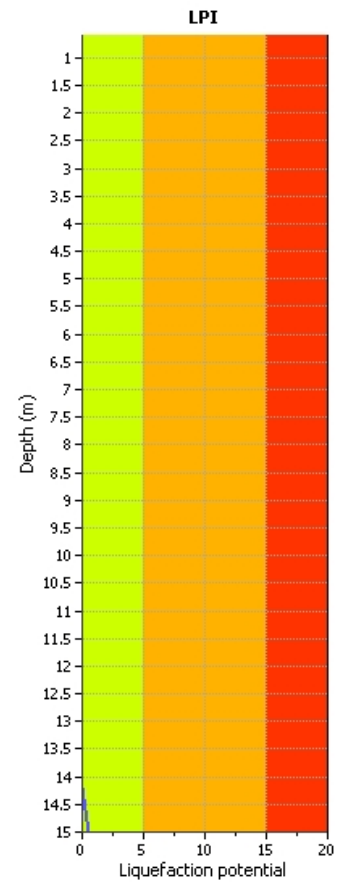
**Grafico 288 - 203010C123**



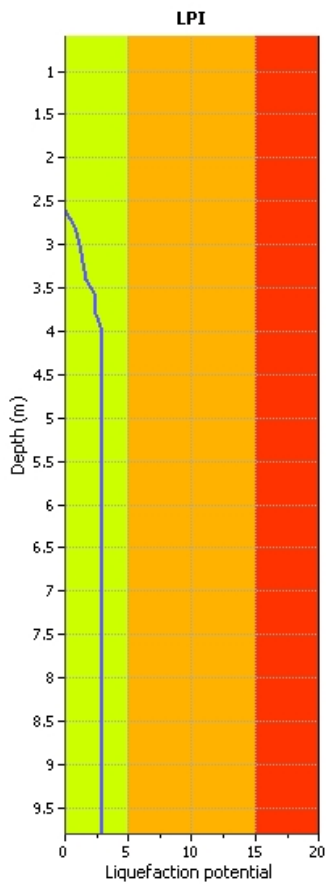
**Grafico 289 - 203010C124**



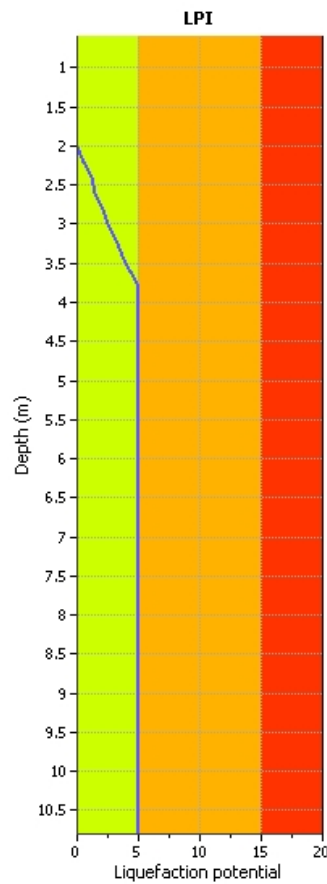
**Grafico 290 - 203010C125**



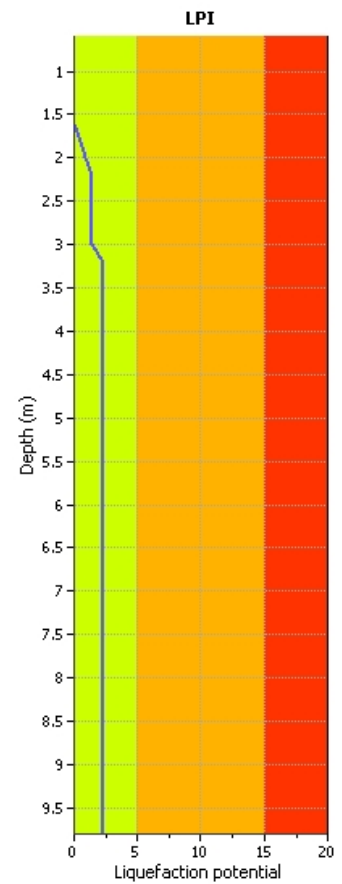
**Grafico 291 - 203010C126**



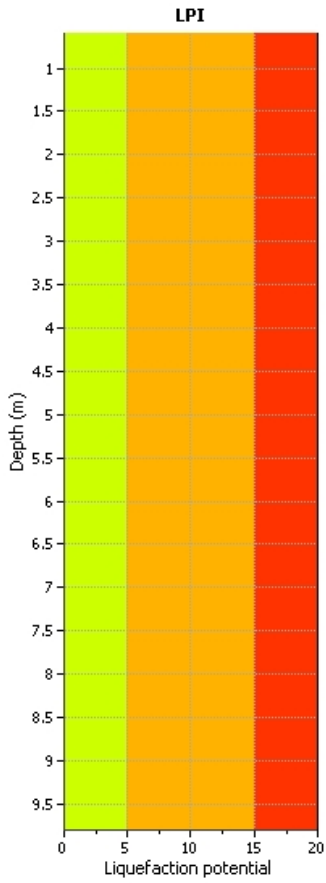
**Grafico 292 - 203010C127**



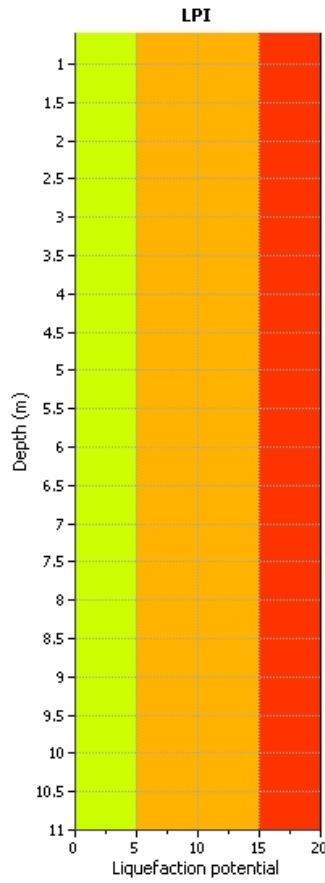
**Grafico 293 - 203010C128**



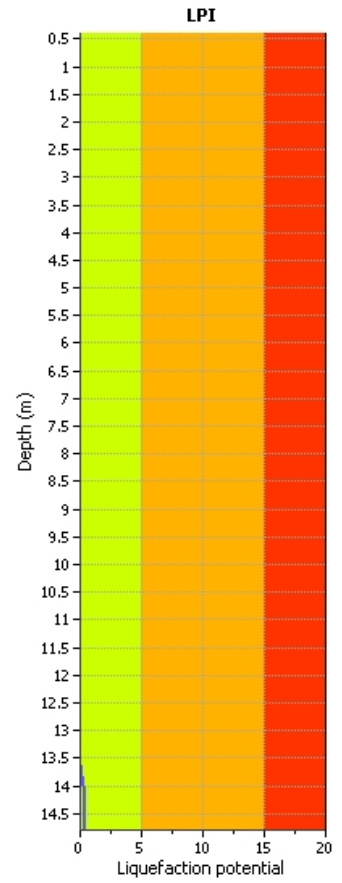
**Grafico 294 - 203010C129**



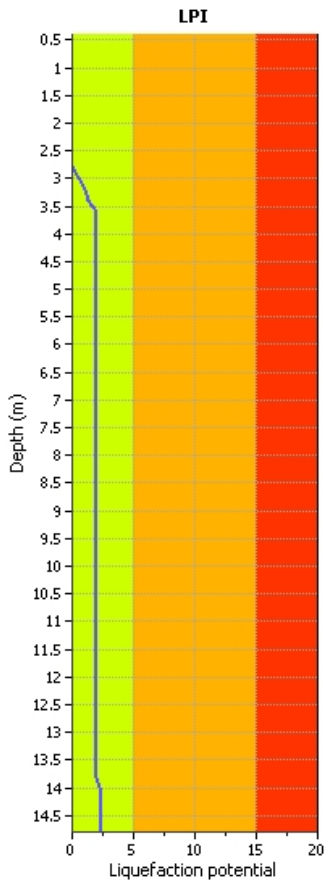
**Grafico 295 - 203010C130**



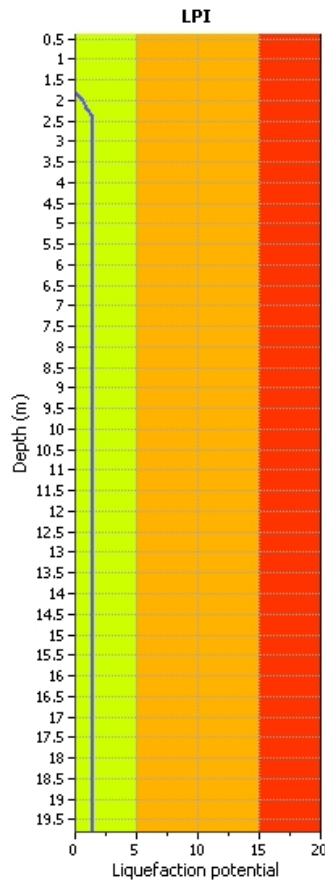
**Grafico 296 - 203010C131**



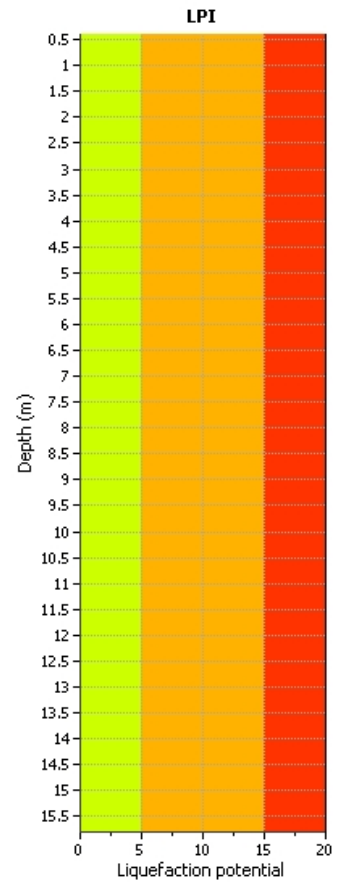
**Grafico 297 - 203010C132**



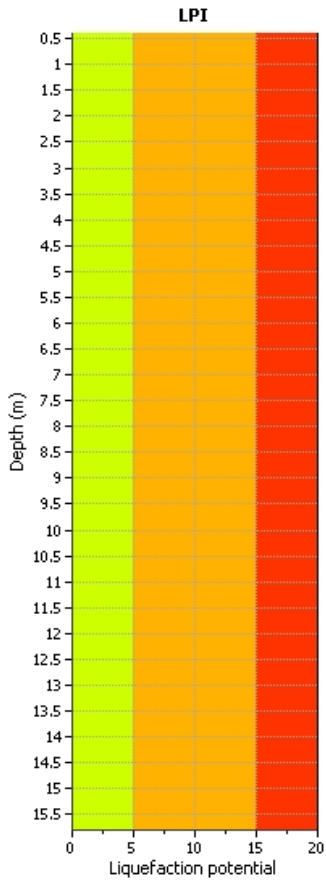
**Grafico 298 - 203010C133**



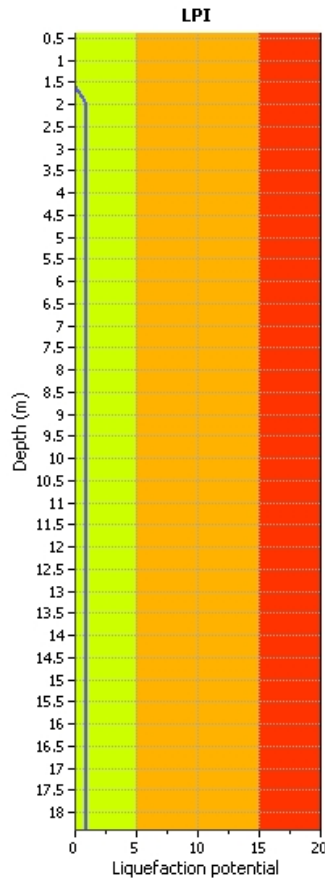
**Grafico 299 - 203010C134**



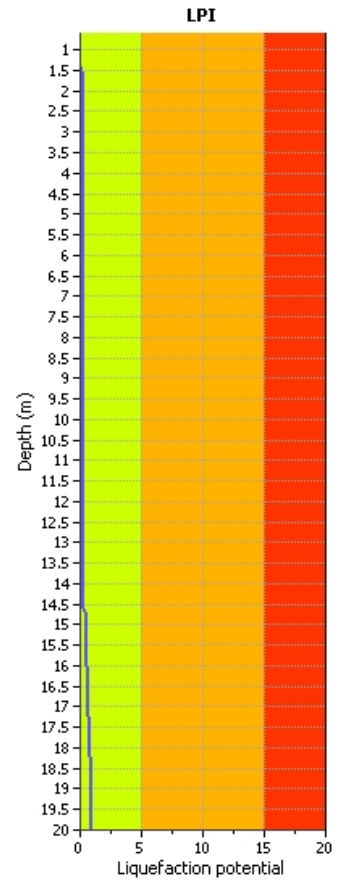
**Grafico 300 - 203010C135**



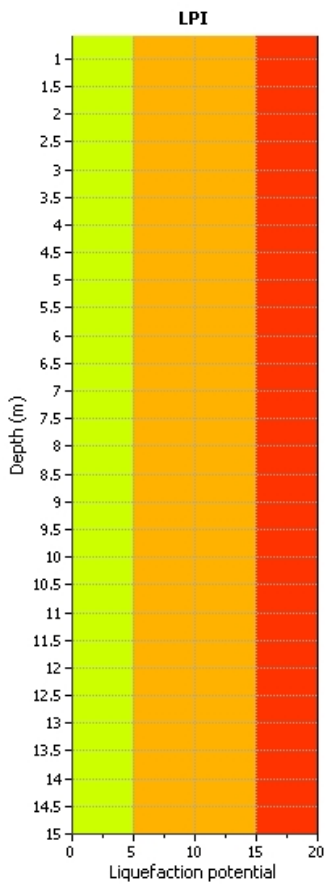
**Grafico 301 - 203010C136**



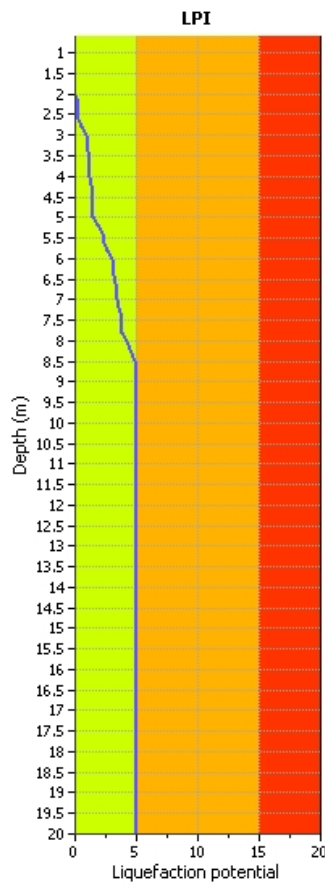
**Grafico 302 - 203010C137**



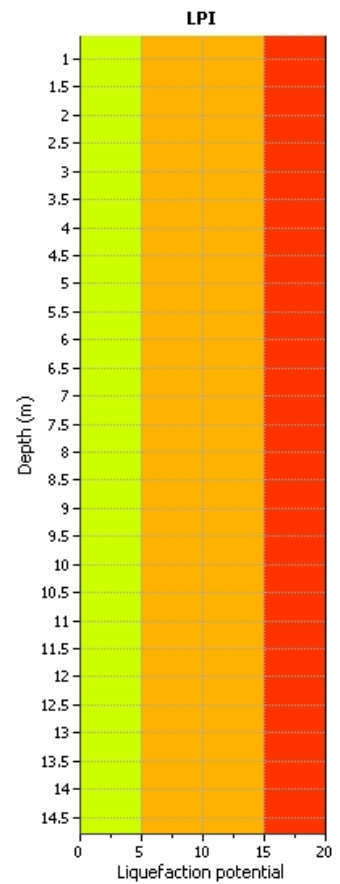
**Grafico 303 - 203010C138**



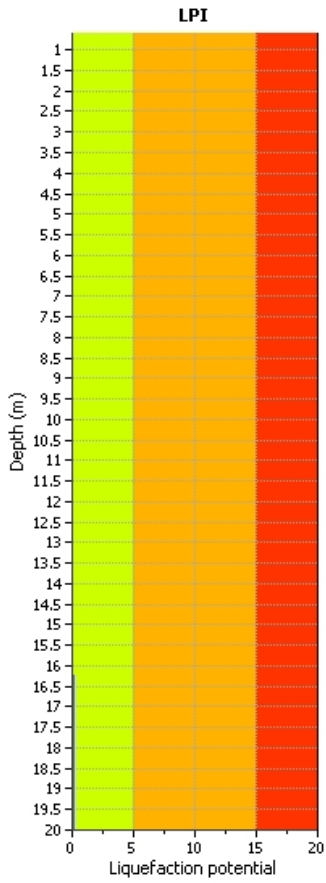
**Grafico 304 - 203010C139**



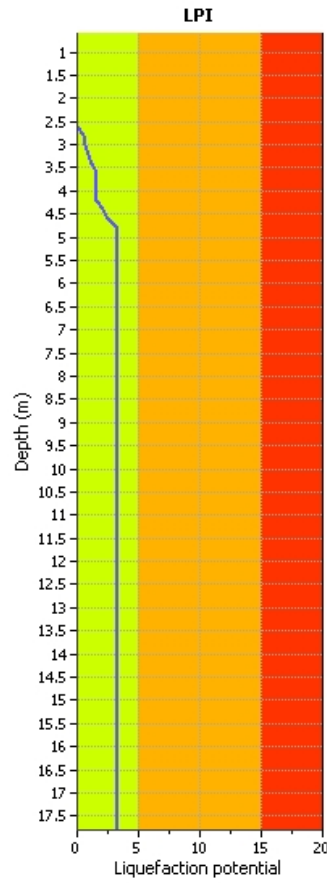
**Grafico 305 - 203010C140**



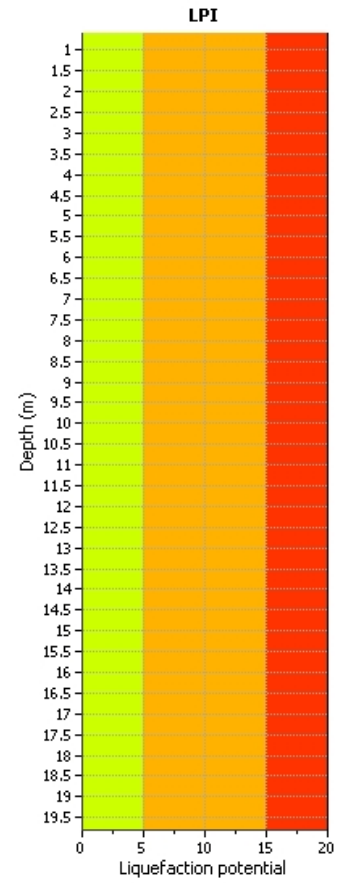
**Grafico 306 - 203010C141**



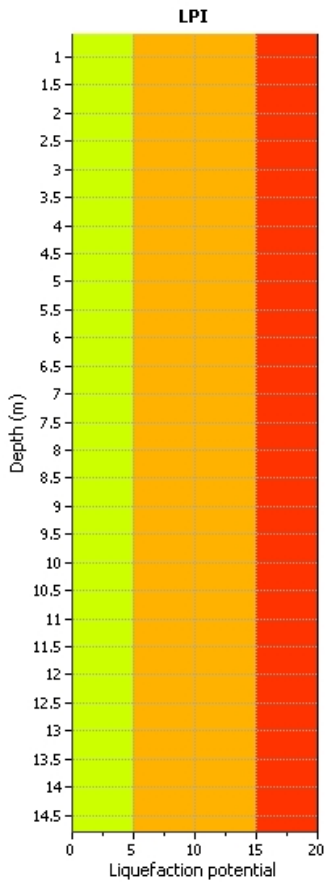
**Grafico 307 - 203010C142**



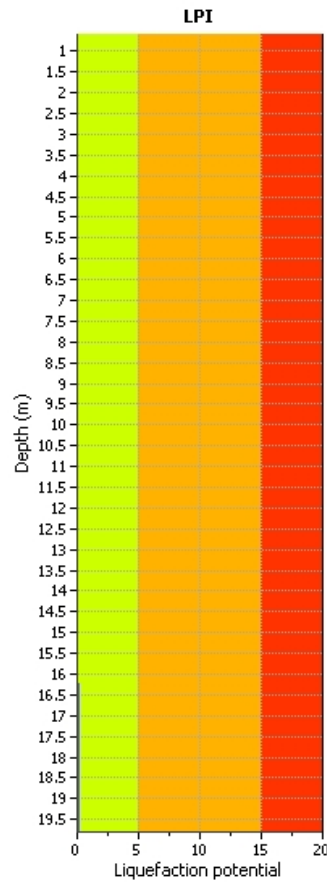
**Grafico 308 - 203010C143**



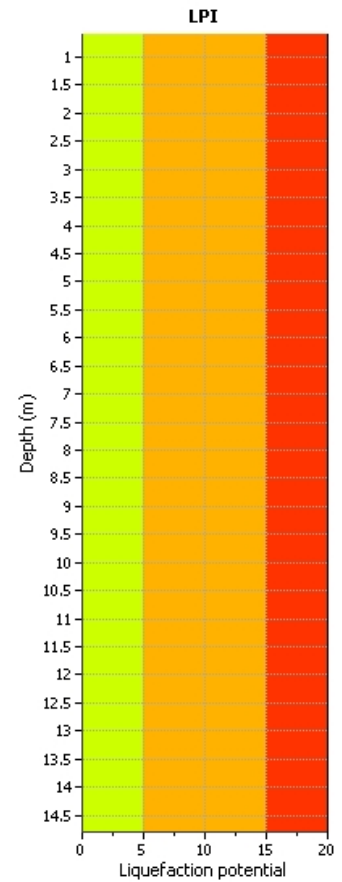
**Grafico 309 - 203010C144**



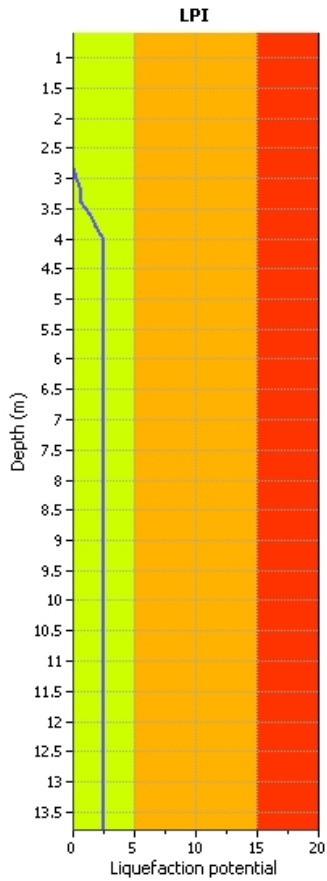
**Grafico 310 - 203010C145**



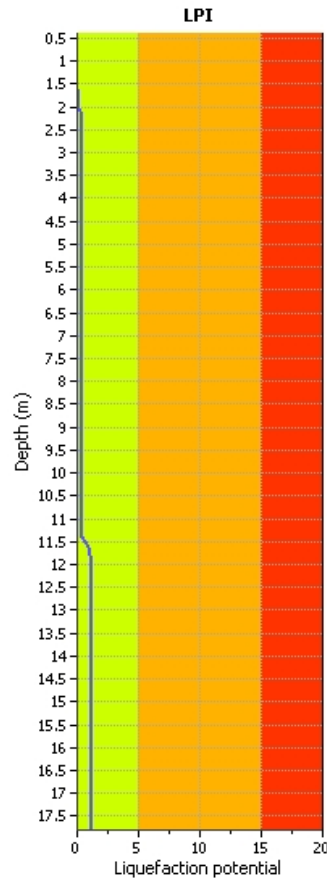
**Grafico 311 - 203010C146**



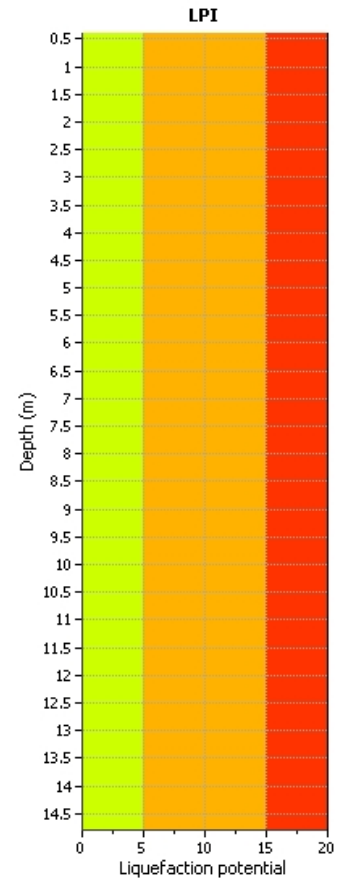
**Grafico 312 - 203010C147**



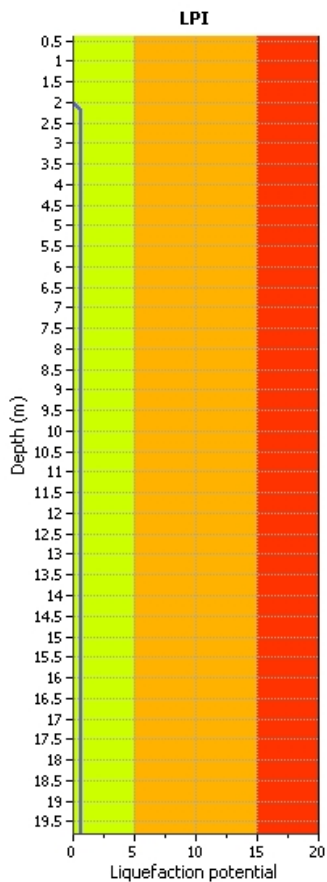
**Grafico 313 - 203010C148**



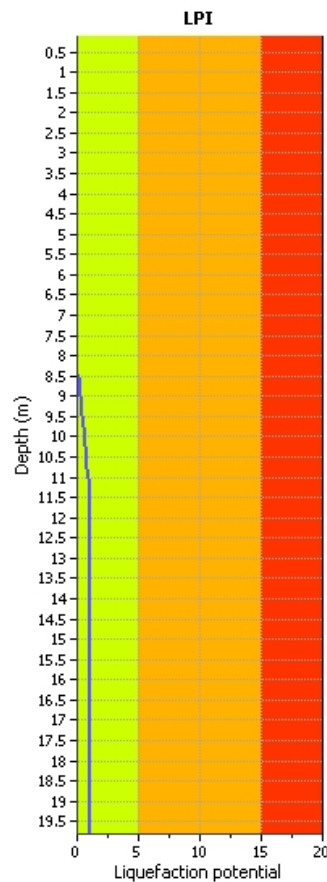
**Grafico 314 - 203010C149**



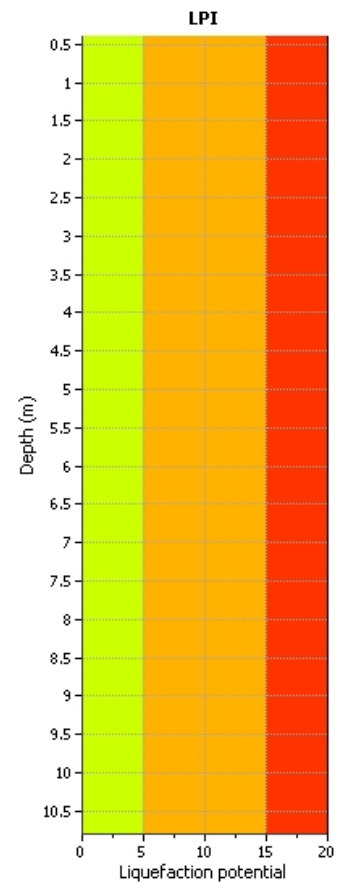
**Grafico 315 - 203010C150**



**Grafico 316 - 203010C151**

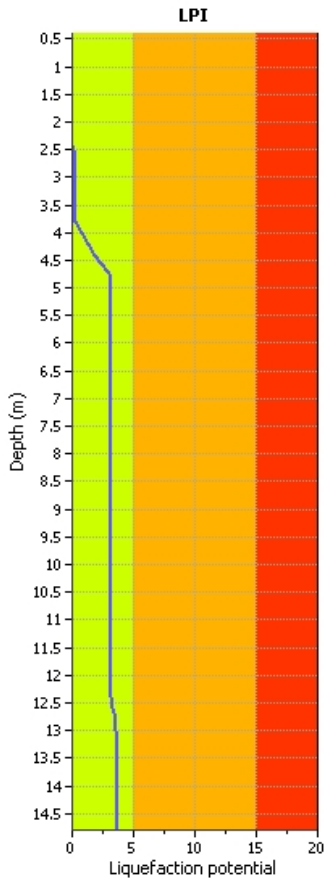


**Grafico 317 - 203010C152**

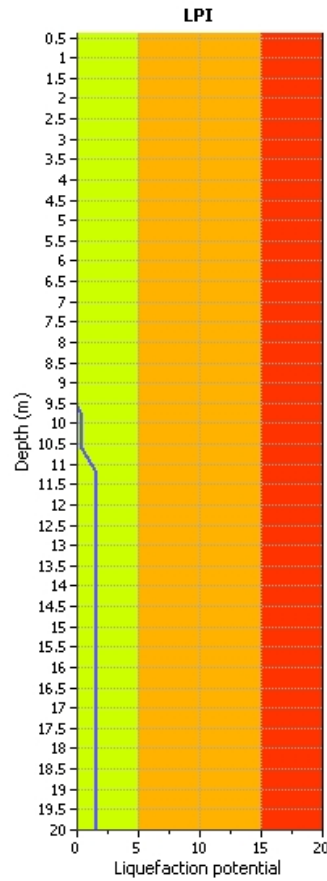


**Grafico 318 - 203010C153**

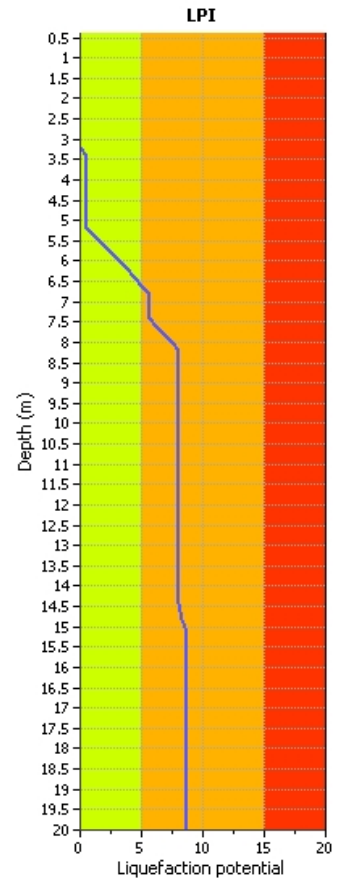




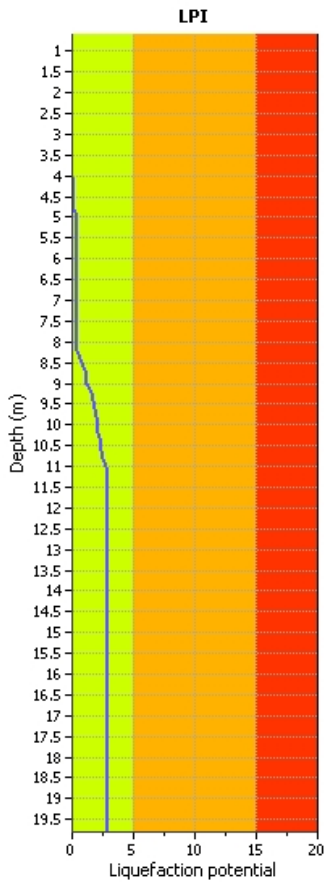
**Grafico 319 - 203010C154**



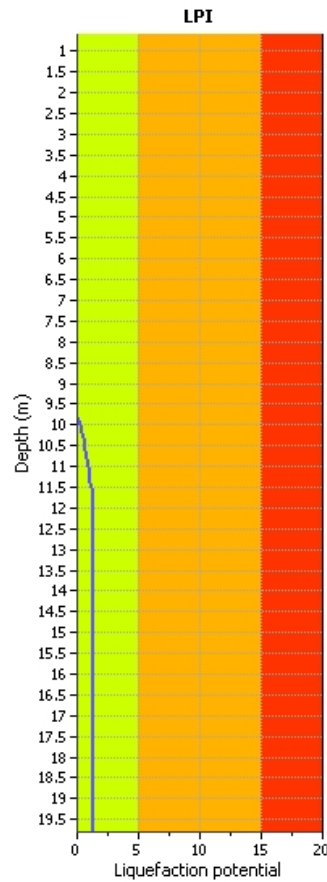
**Grafico 320 - 203010C155**



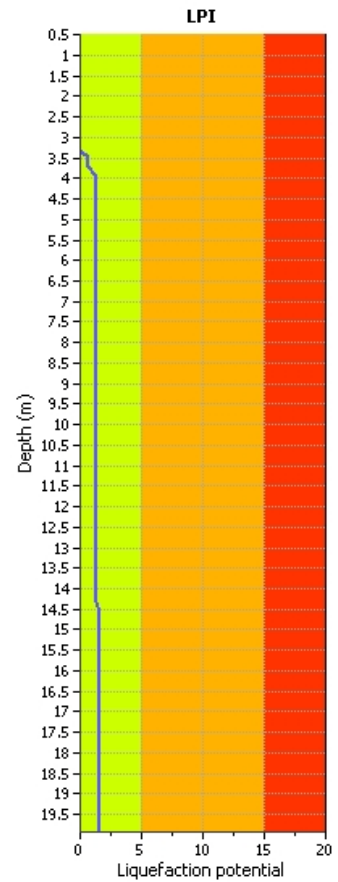
**Grafico 321 - 203010C156**



**Grafico 322 - 203010C157A**

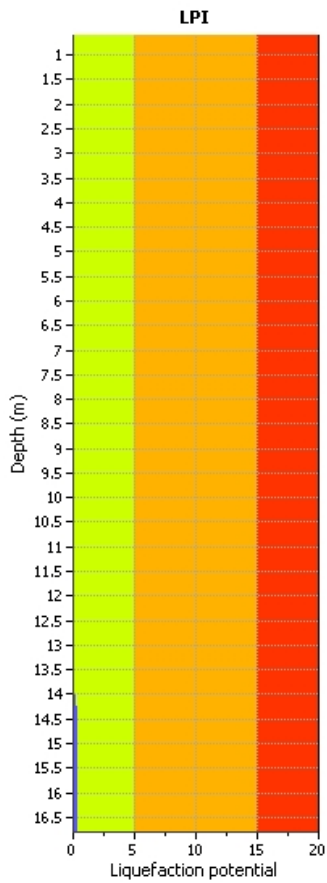


**Grafico 323 - 203010C157B**

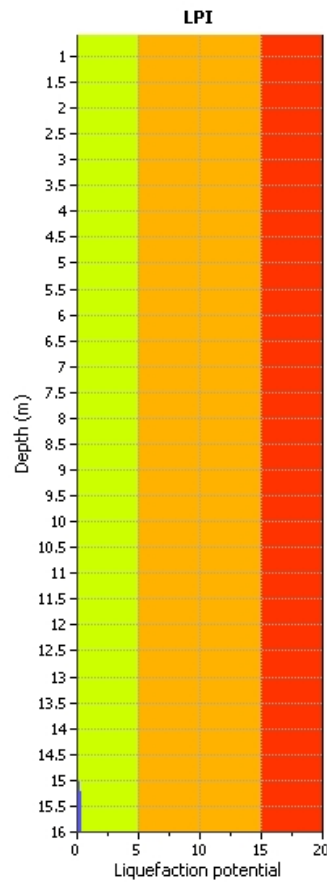


**Grafico 324 - 203010C158A**

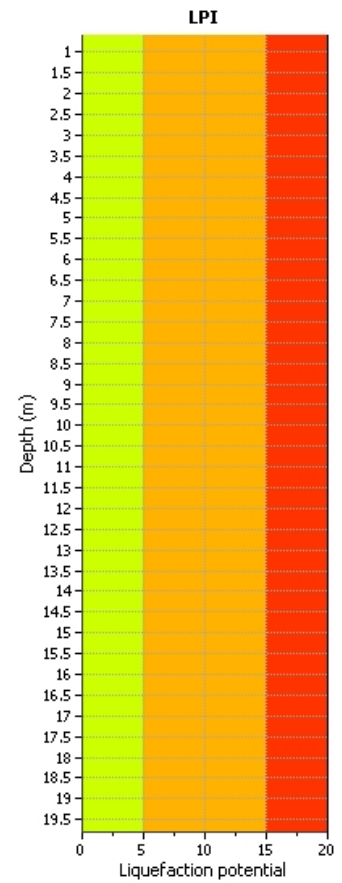




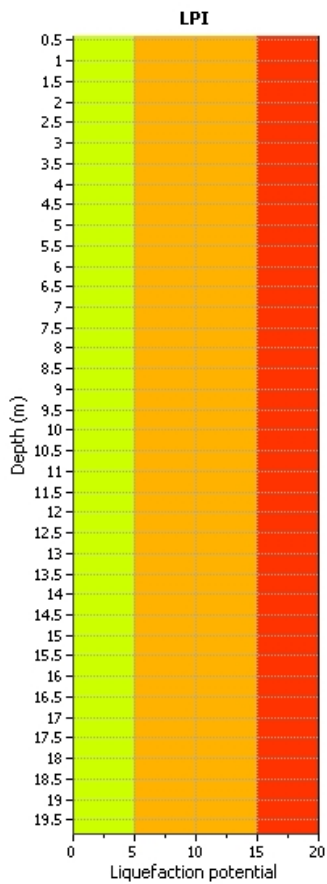
**Grafico 325 - 203010C158B**



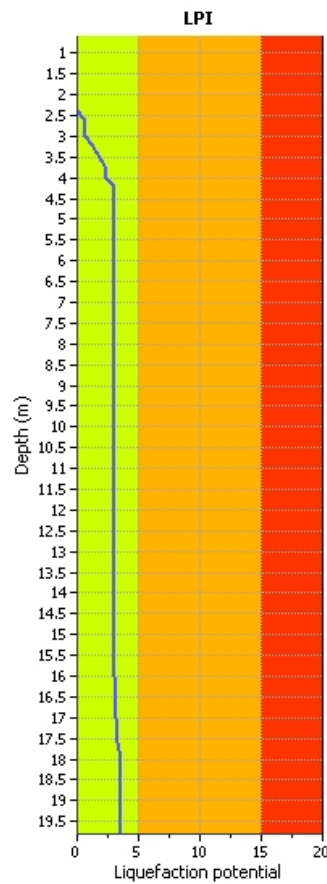
**Grafico 326 - 203010C159**



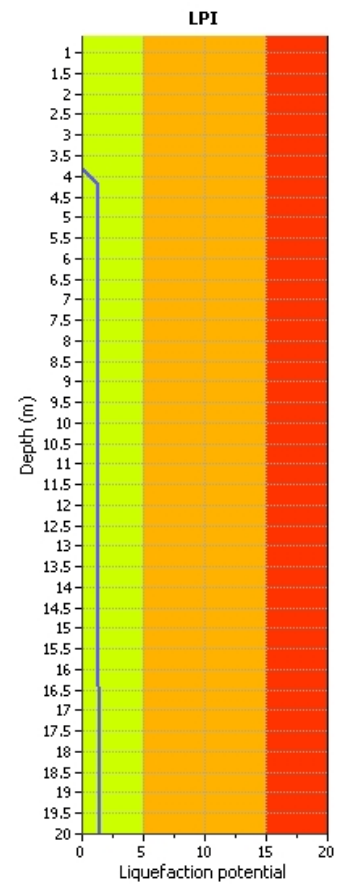
**Grafico 327 - 203010C160A**



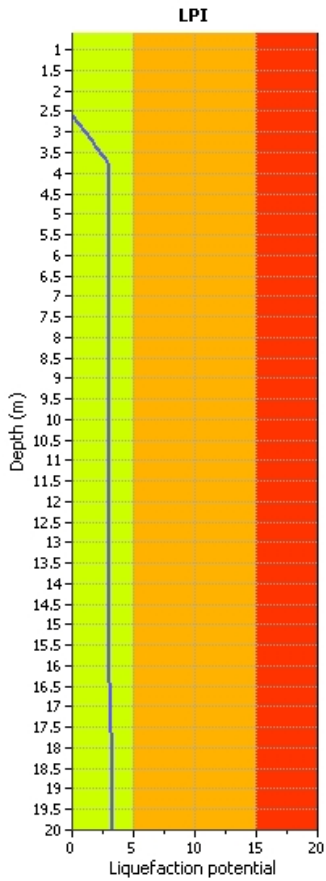
**Grafico 328 - 203010C160B**



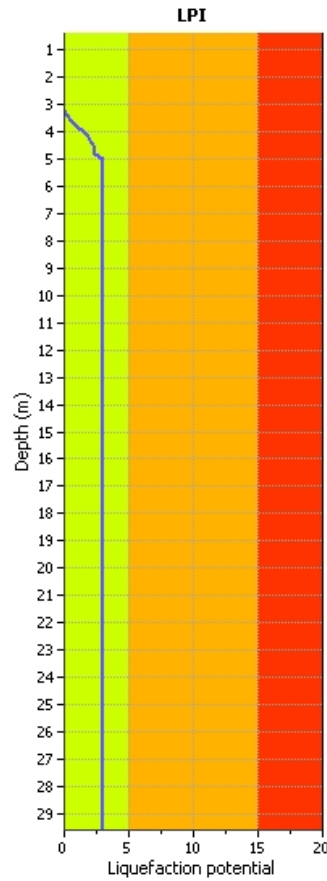
**Grafico 329 - 203010C161A**



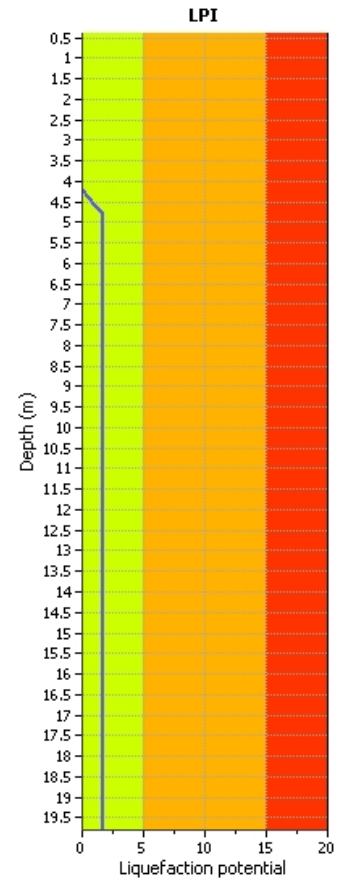
**Grafico 330 - 203010C161B**



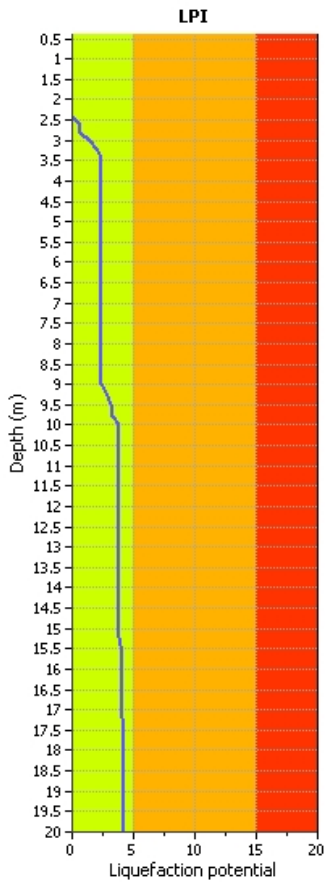
**Grafico 331 - 203010C162**



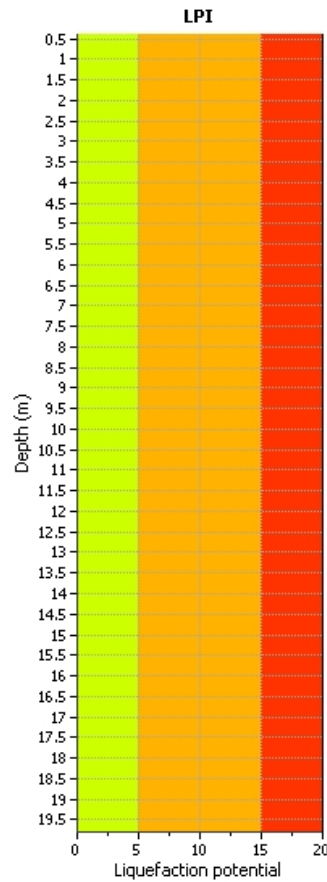
**Grafico 332 - 203010C163A**



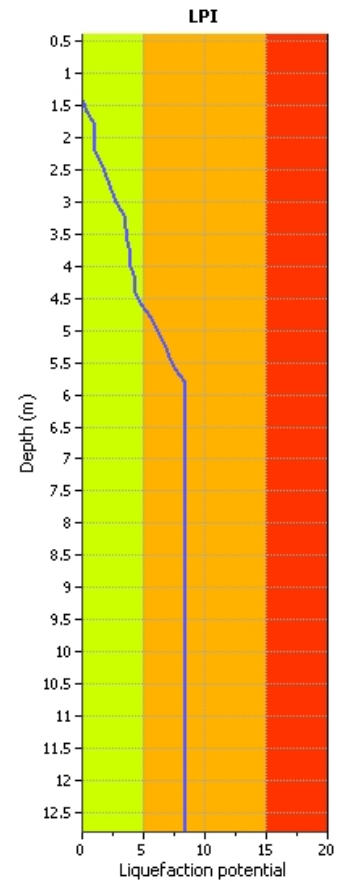
**Grafico 333 - 203010C163B**



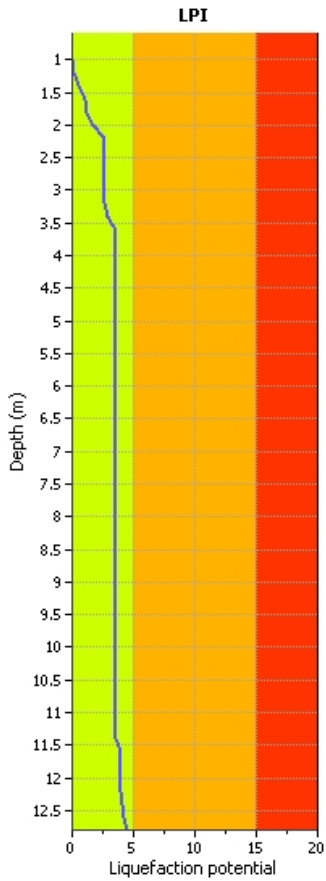
**Grafico 334 - 203010C164A**



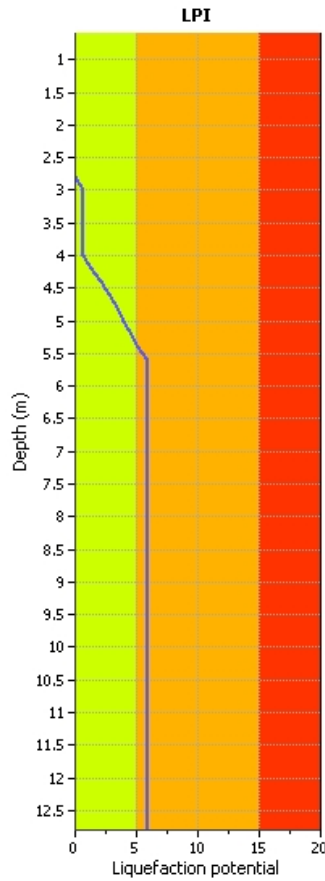
**Grafico 335 - 203010C164B**



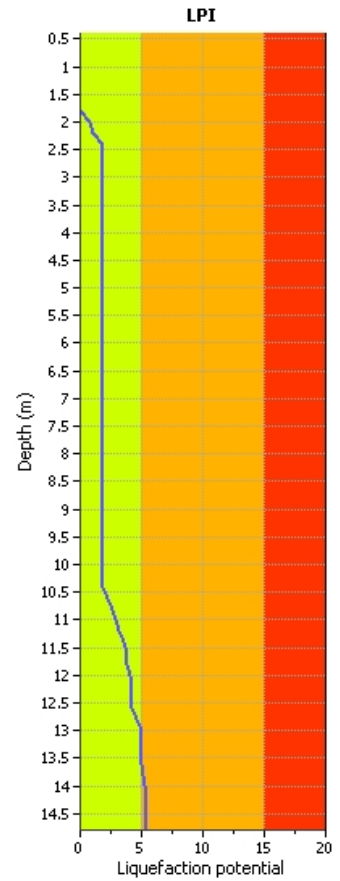
**Grafico 336 - 203010C165**



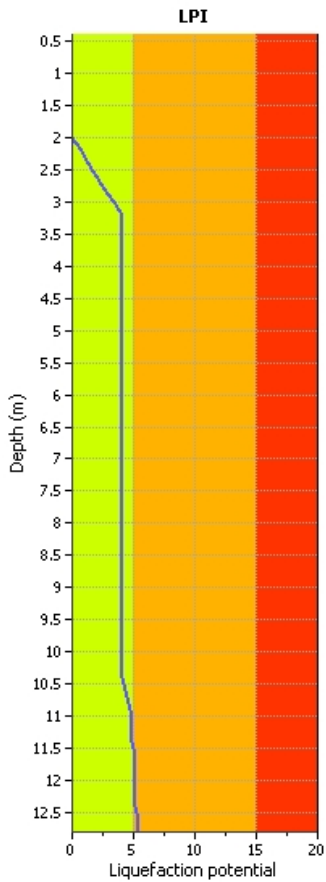
**Grafico 337 - 203010C166**



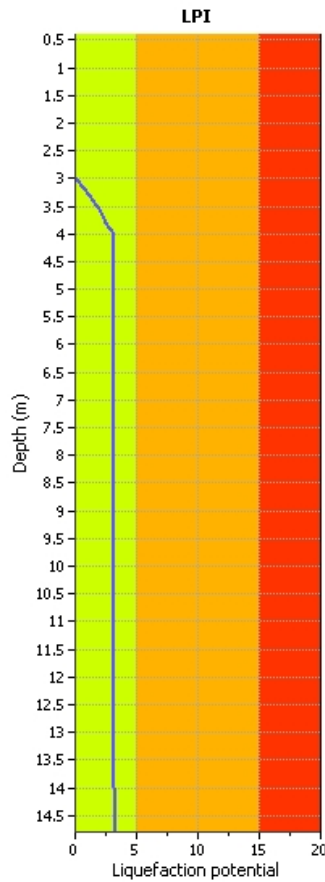
**Grafico 338 - 203010C167**



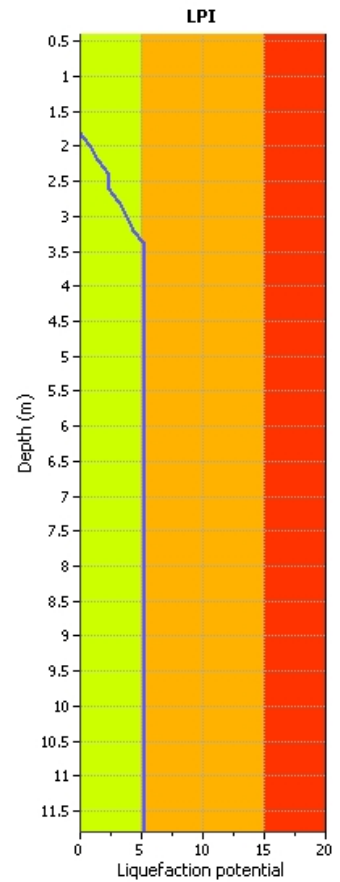
**Grafico 339 - 203010C168**



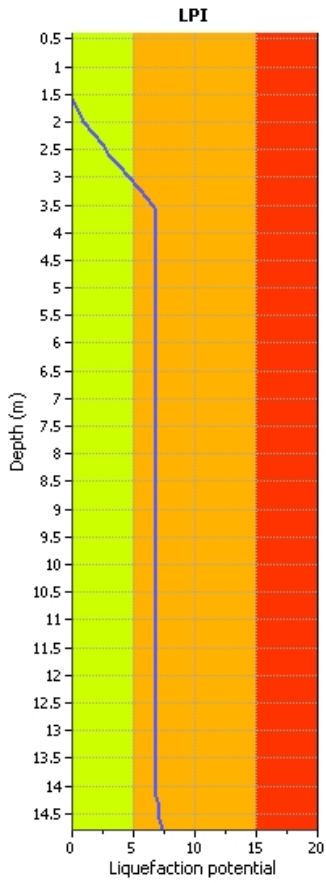
**Grafico 340 - 203010C169**



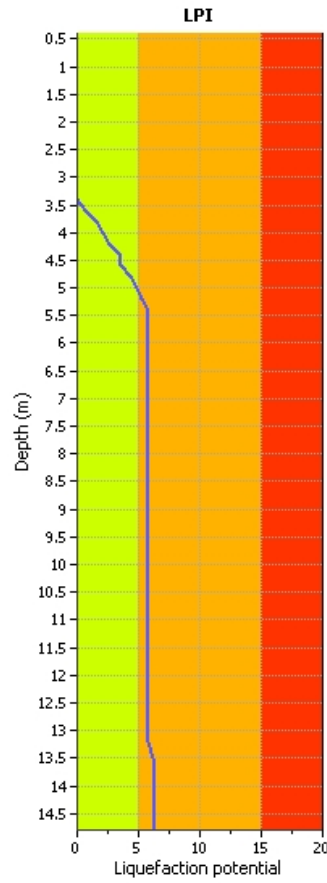
**Grafico 341 - 203010C170**



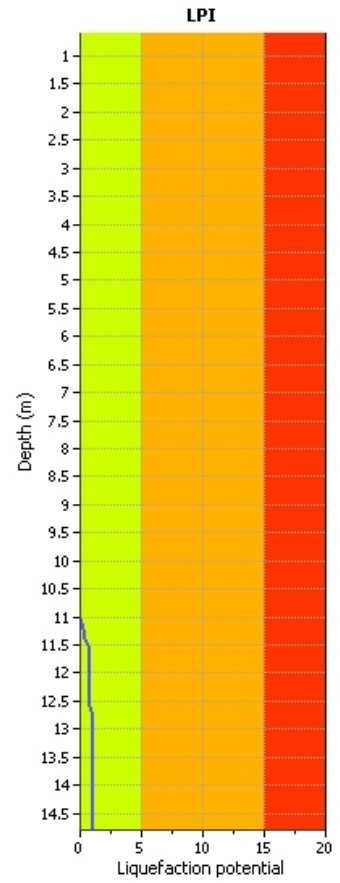
**Grafico 342 - 203010C171**



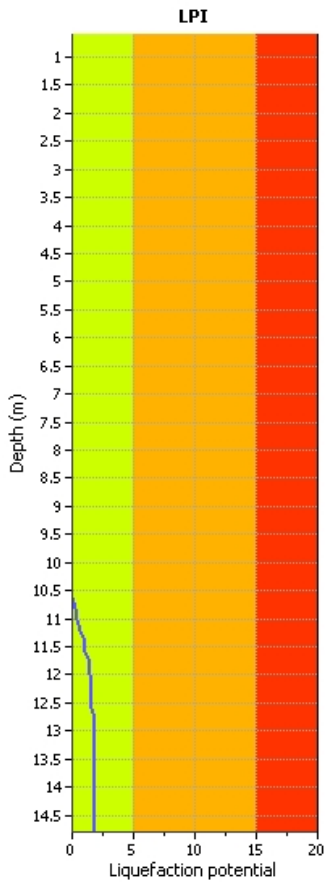
**Grafico 343 - 203010C172**



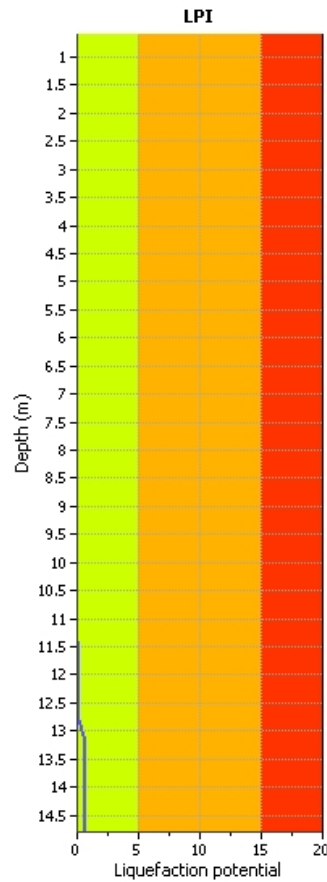
**Grafico 344 - 203010C173**



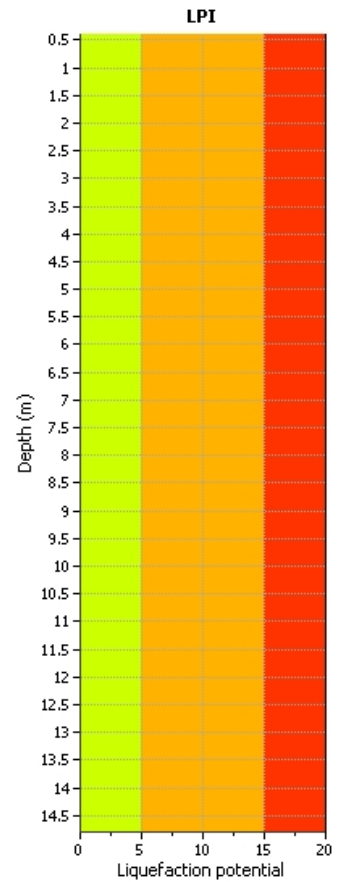
**Grafico 345 - 203010C174**



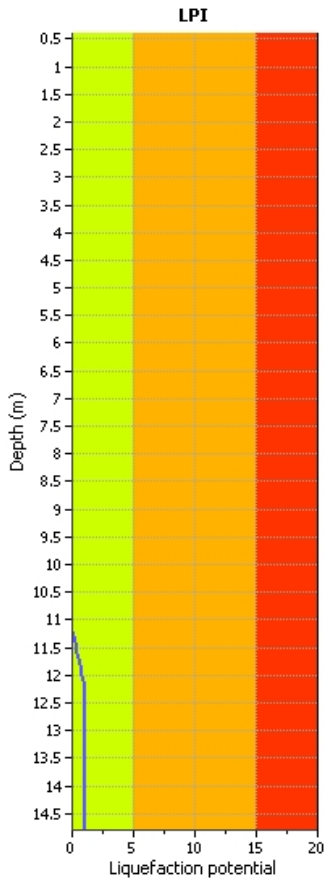
**Grafico 346 - 203010C175**



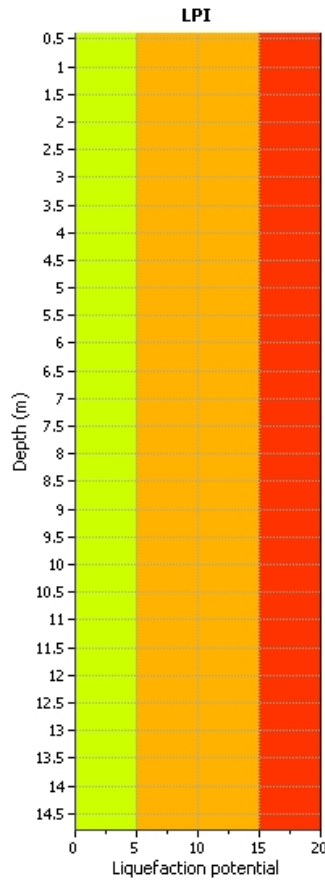
**Grafico 347 - 203010C176**



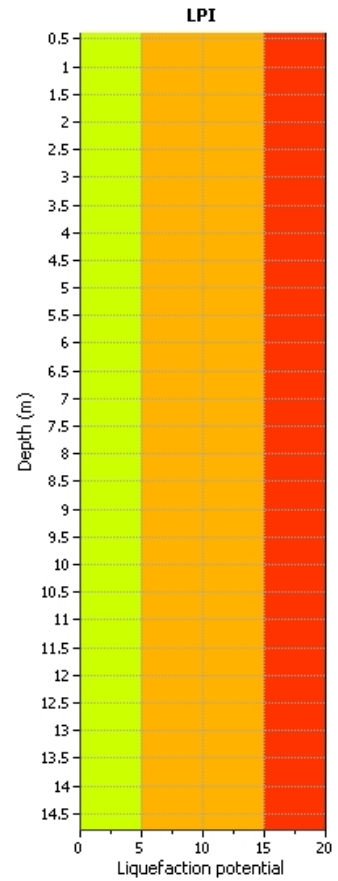
**Grafico 348 - 203010C177**



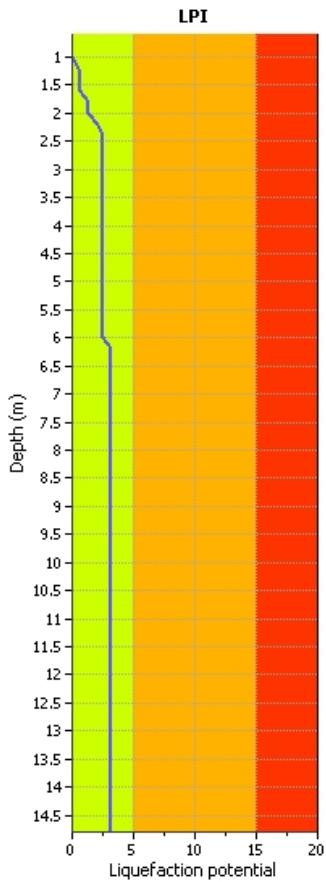
**Grafico 349 - 203010C178**



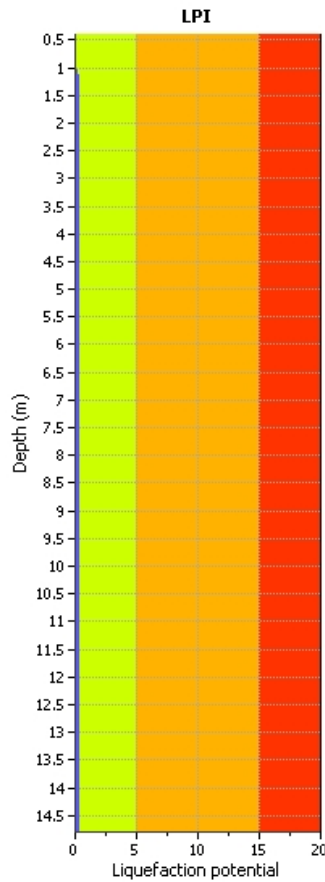
**Grafico 350 - 203010C179**



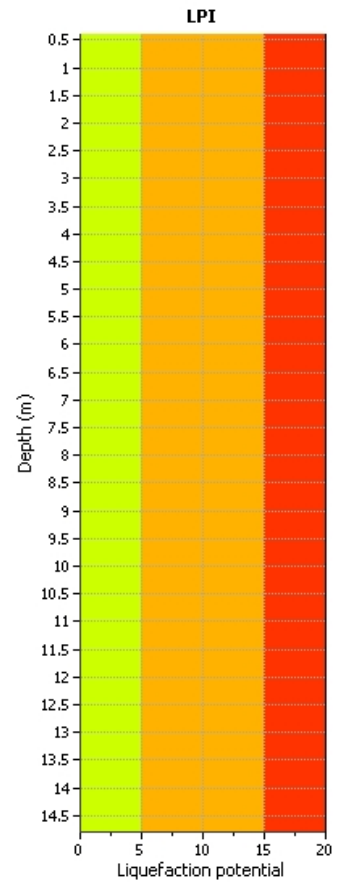
**Grafico 351 - 203010C180**



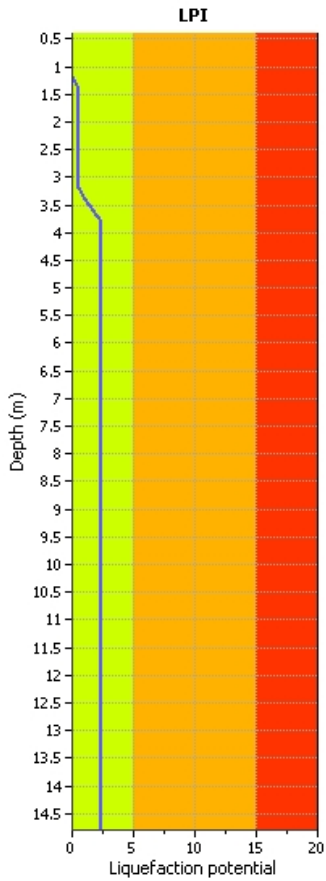
**Grafico 352 - 203010C181**



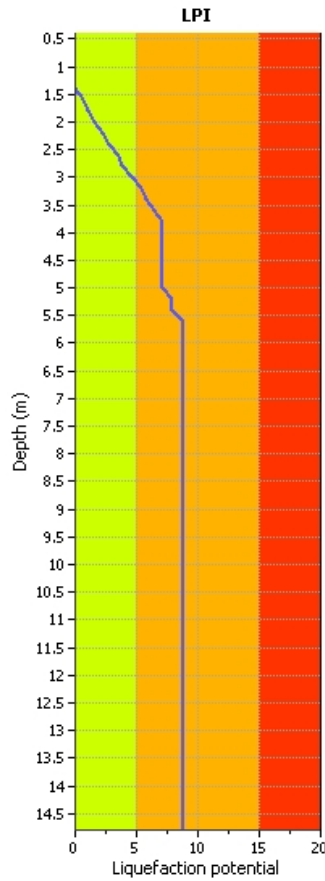
**Grafico 353 - 203010C182**



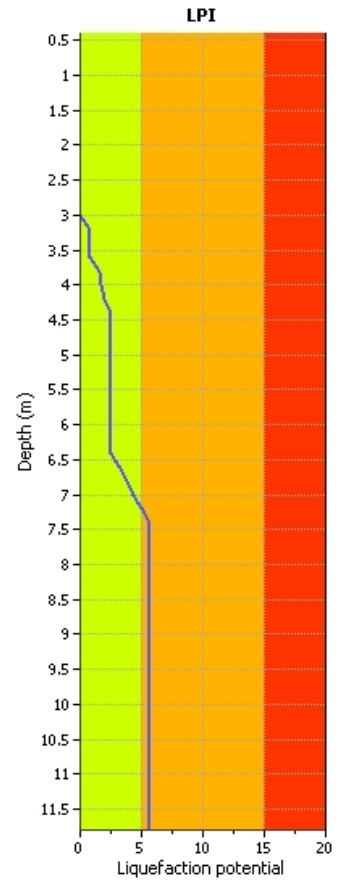
**Grafico 354 - 203010C183**



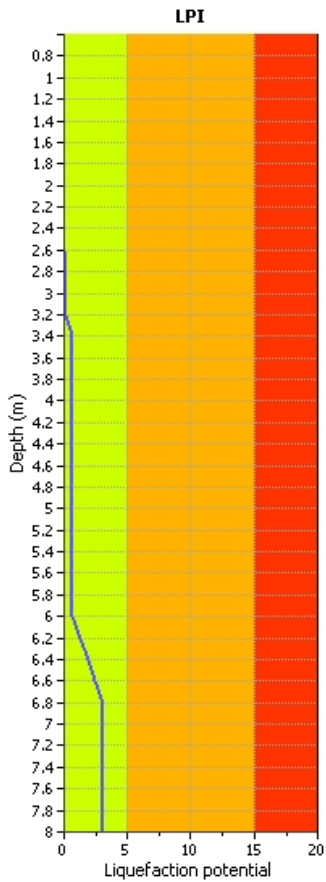
**Grafico 355 - 203010C184**



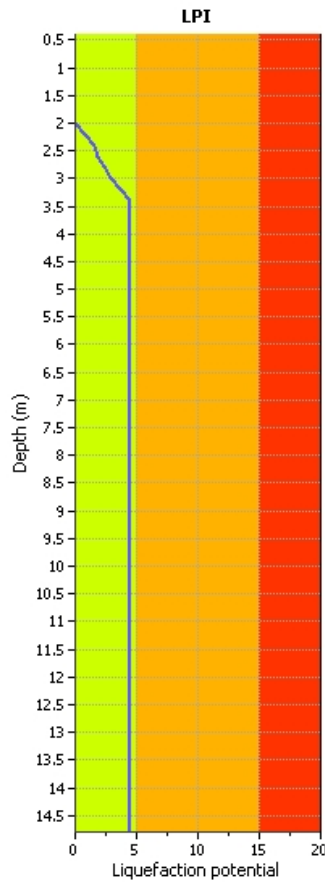
**Grafico 356 - 203010C185**



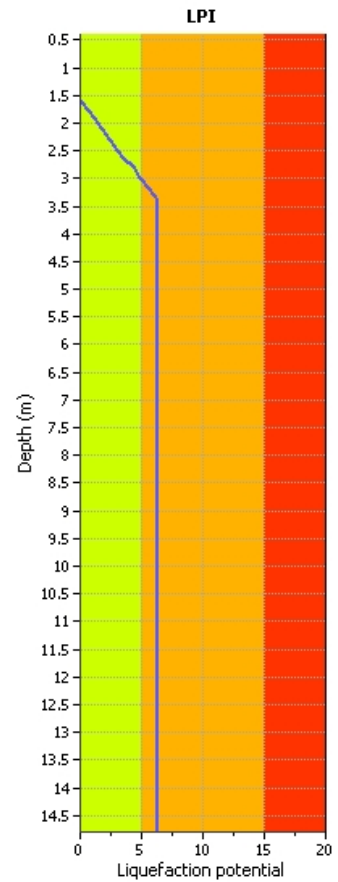
**Grafico 357 - 203010C186**



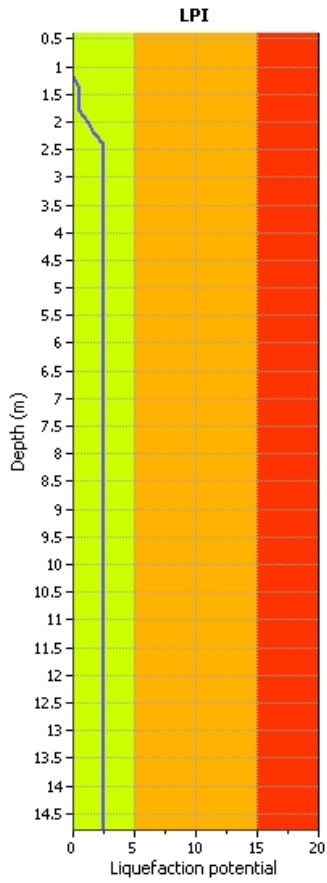
**Grafico 358 - 203010C187**



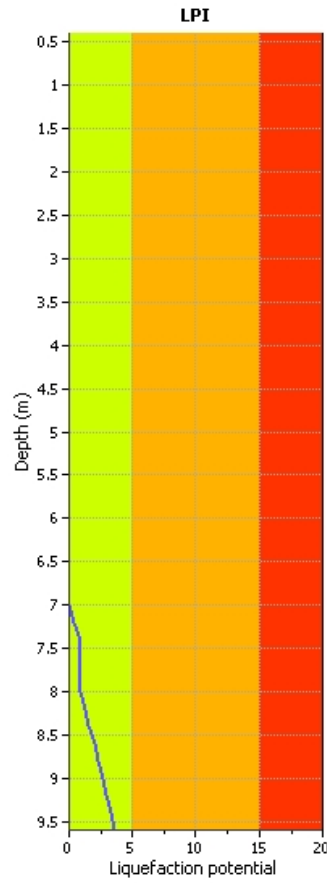
**Grafico 359 - 203010C188**



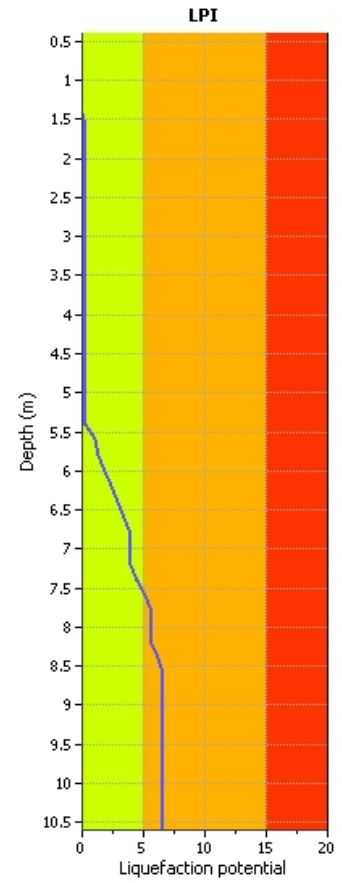
**Grafico 360 - 203010C189**



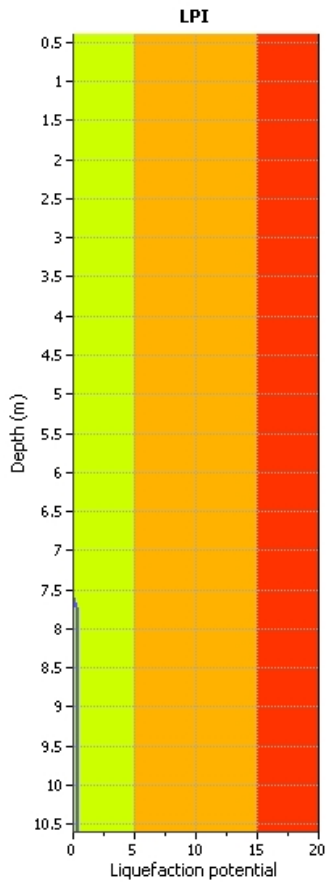
**Grafico 361 - 203010C190**



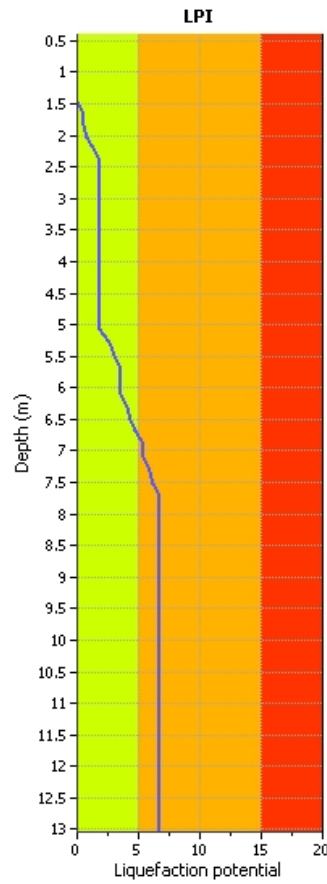
**Grafico 362 - 203010C191**



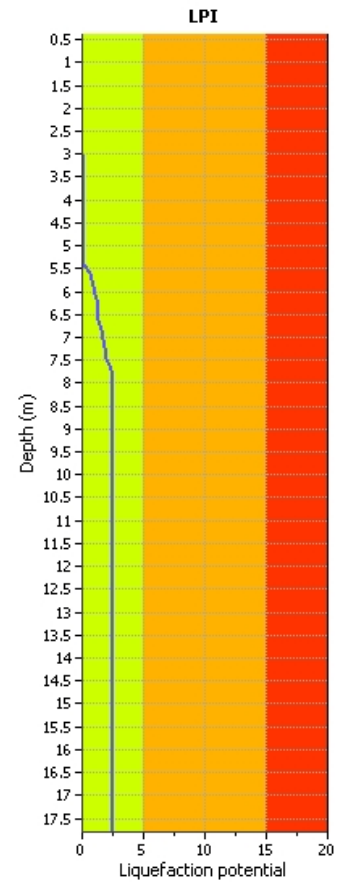
**Grafico 363 - 203010C192**



**Grafico 364 - 203010C193**

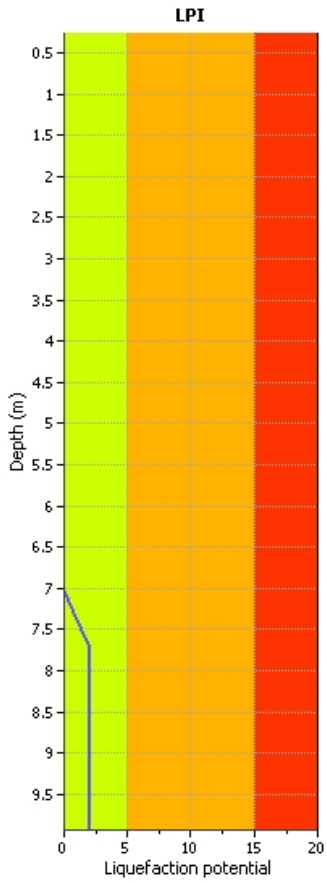


**Grafico 365 - 203010C194**

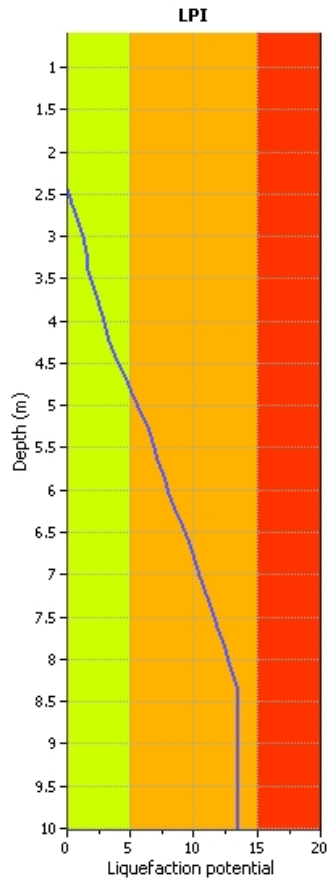


**Grafico 366 - 203010C195**

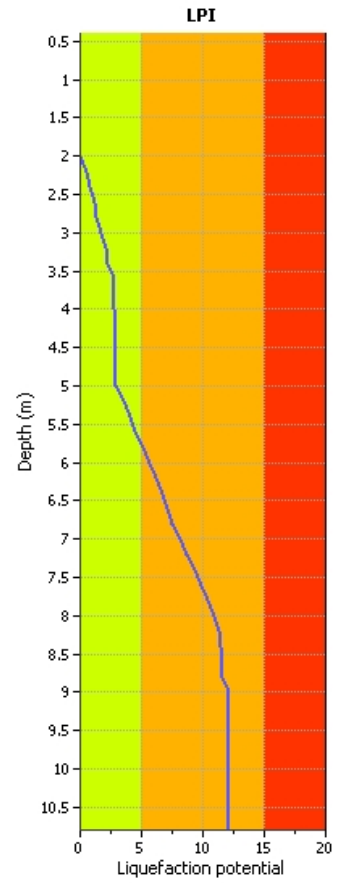




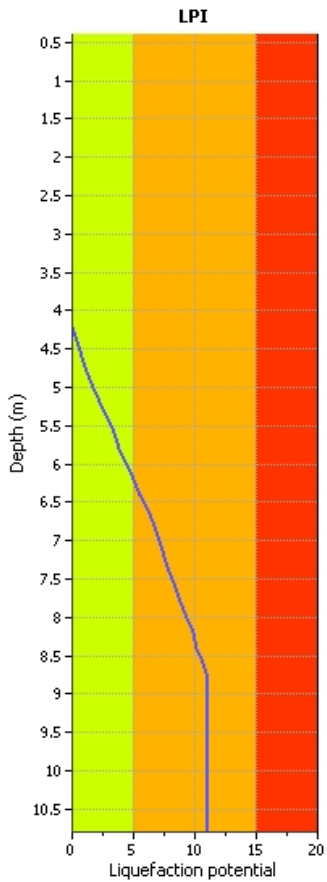
**Grafico 367 - 203010C196**



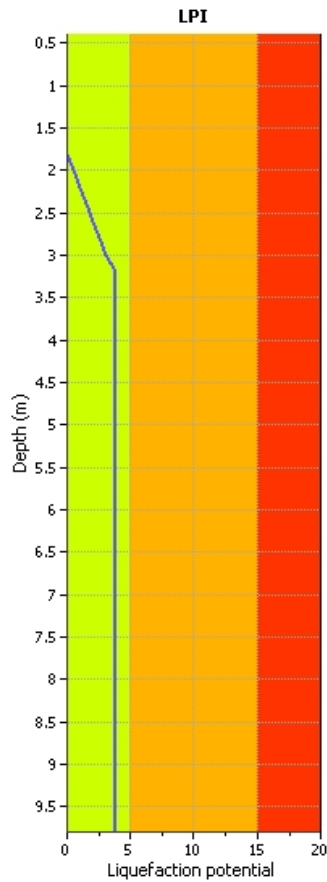
**Grafico 368 - 203010C197**



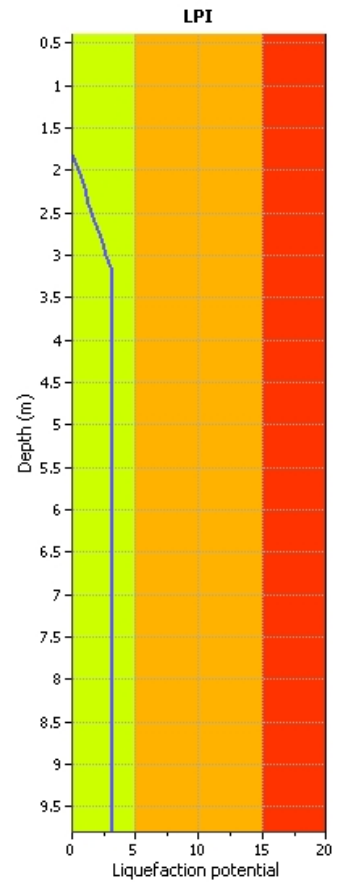
**Grafico 369 - 203010C198**



**Grafico 370 - 203010C199**

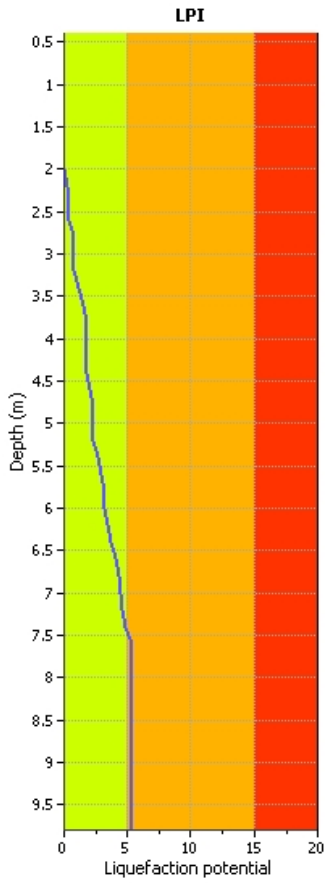


**Grafico 371 - 203010C200**

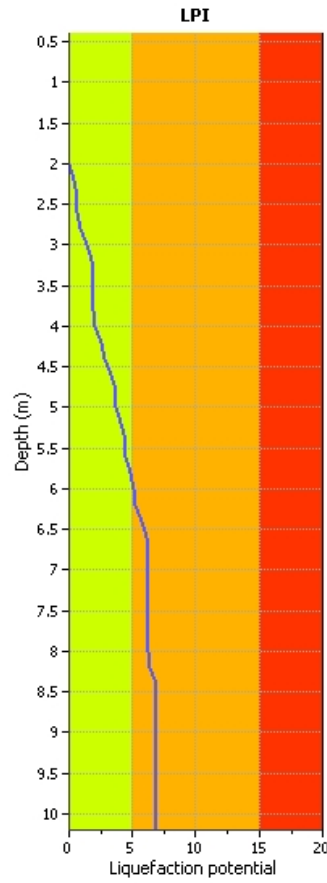


**Grafico 372 - 203010C201**

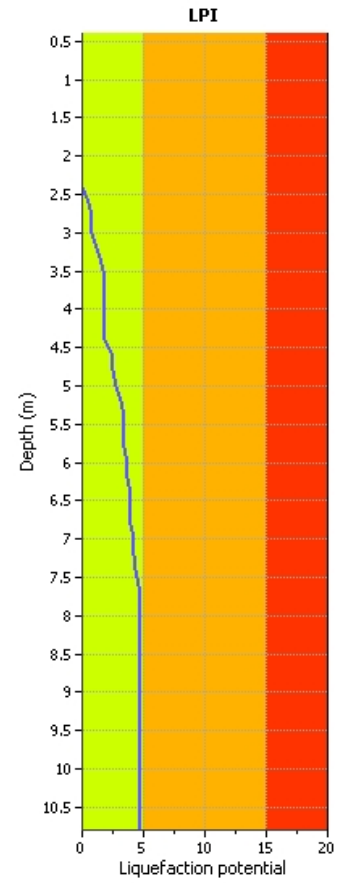




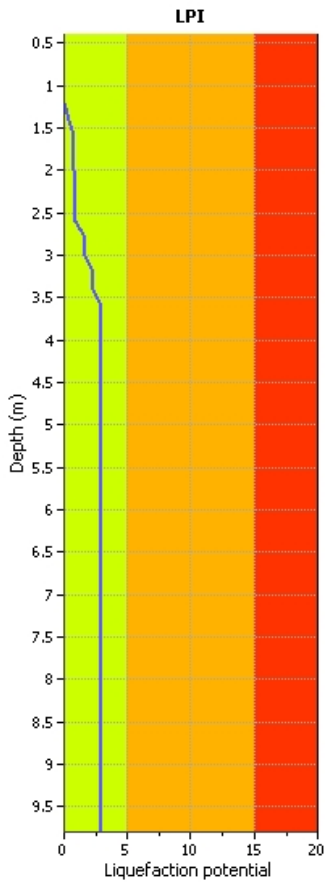
**Grafico 373 - 203010C202**



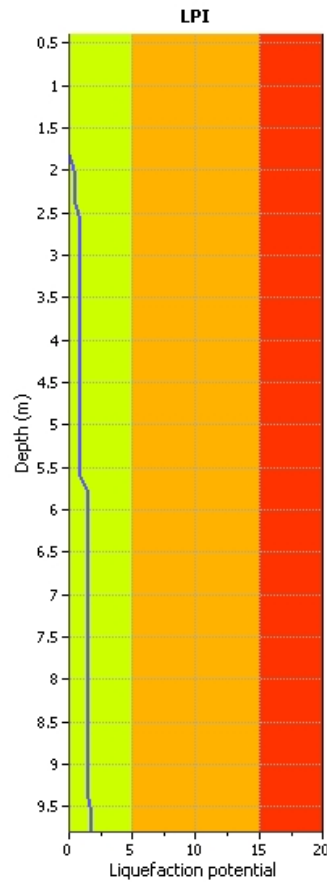
**Grafico 374 - 203010C203**



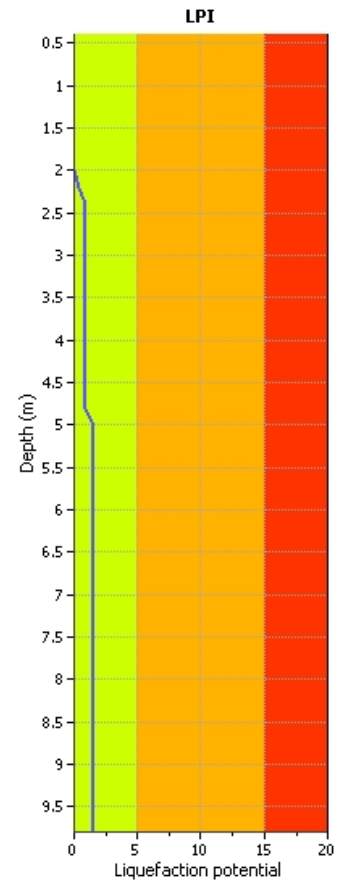
**Grafico 375 - 203010C204**



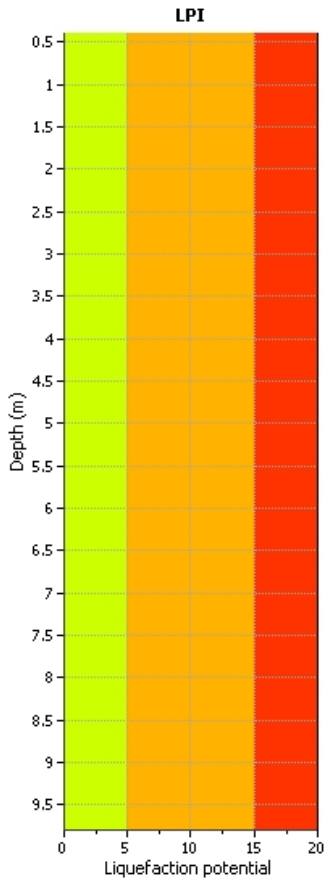
**Grafico 376 - 203010C205**



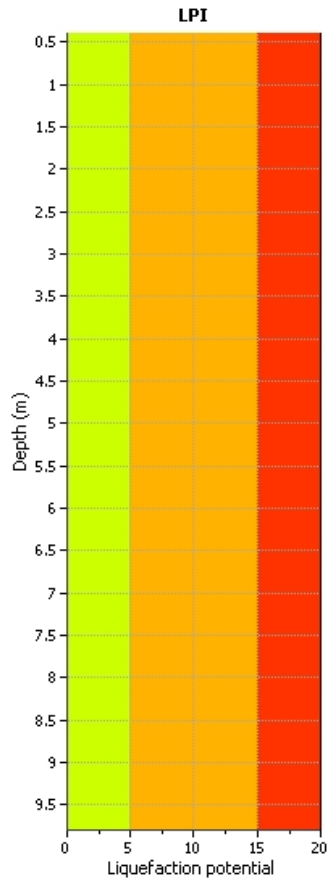
**Grafico 377 - 203010C206**



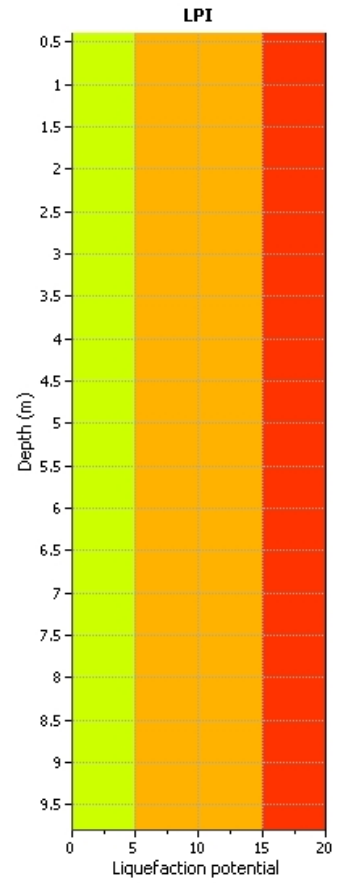
**Grafico 378 - 203010C207**



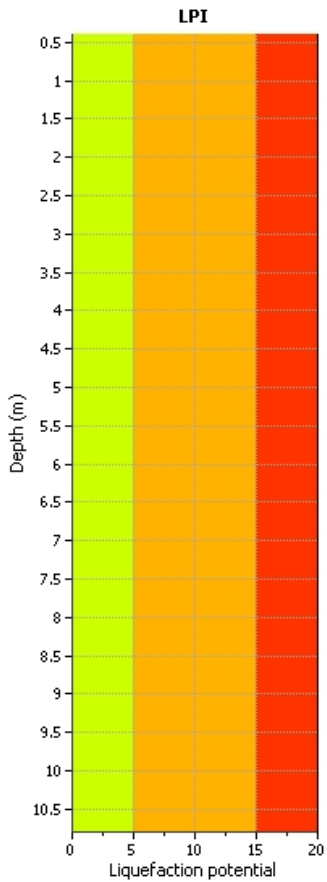
**Grafico 379 - 203010C208**



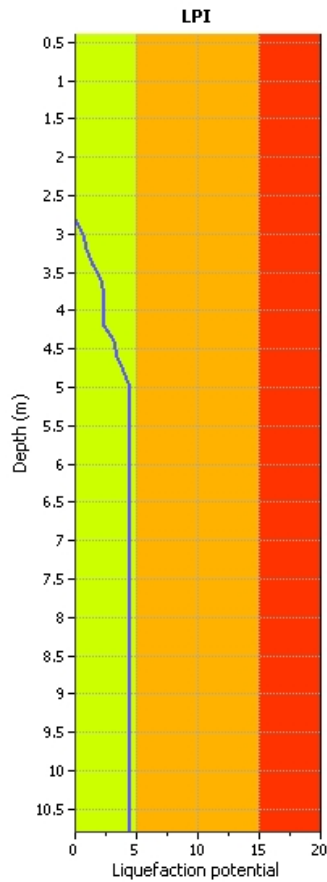
**Grafico 380 - 203010C209**



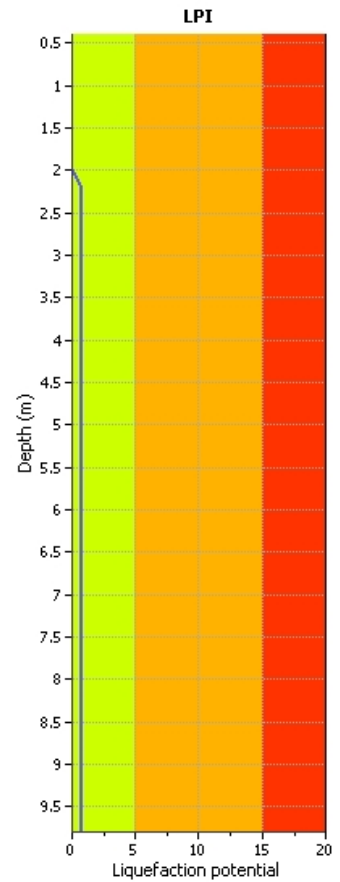
**Grafico 381 - 203010C210**



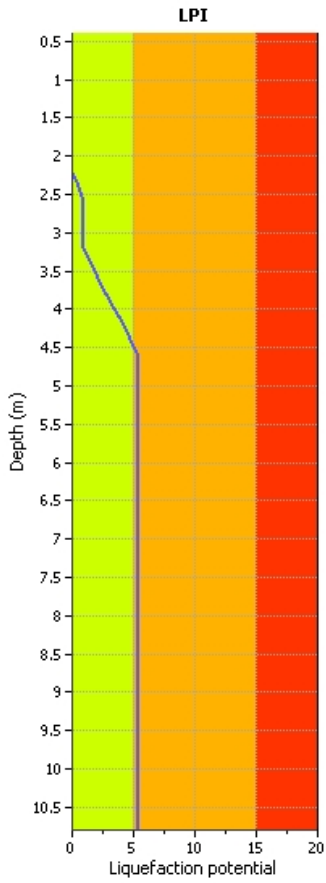
**Grafico 382 - 203010C211**



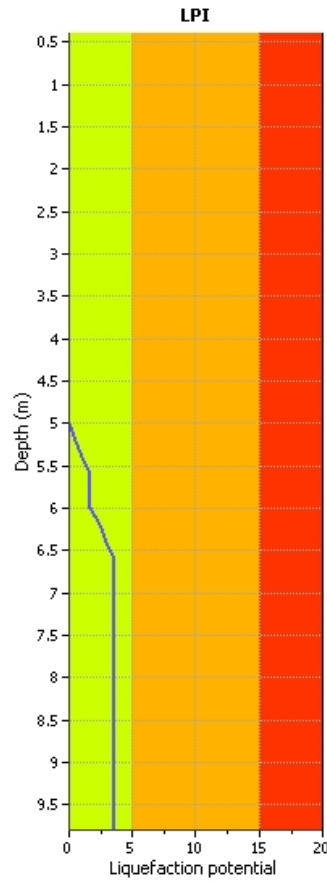
**Grafico 383 - 203010C212**



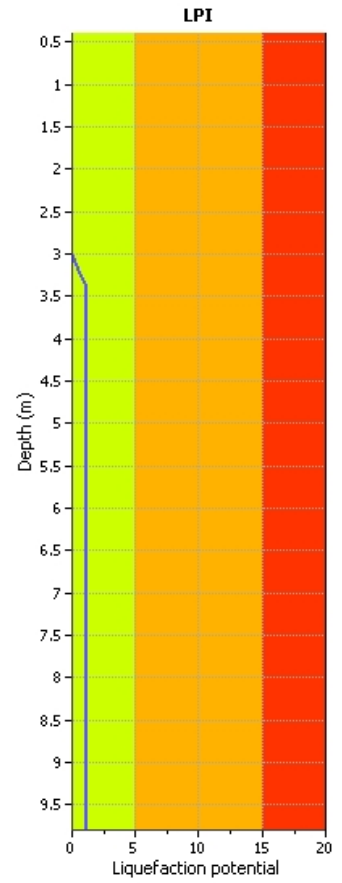
**Grafico 384 - 203010C213**



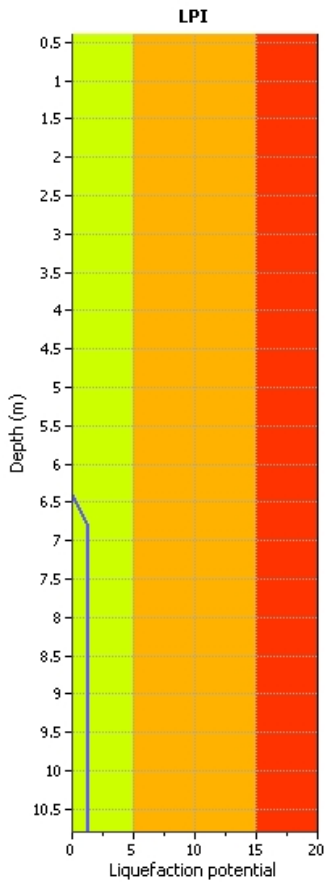
**Grafico 385 - 203010C214**



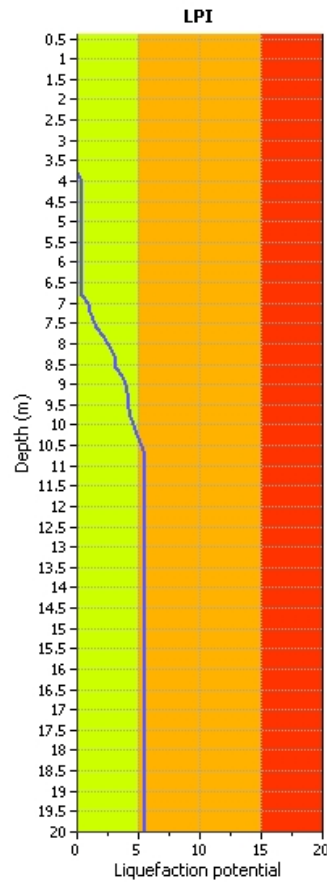
**Grafico 386 - 203010C215**



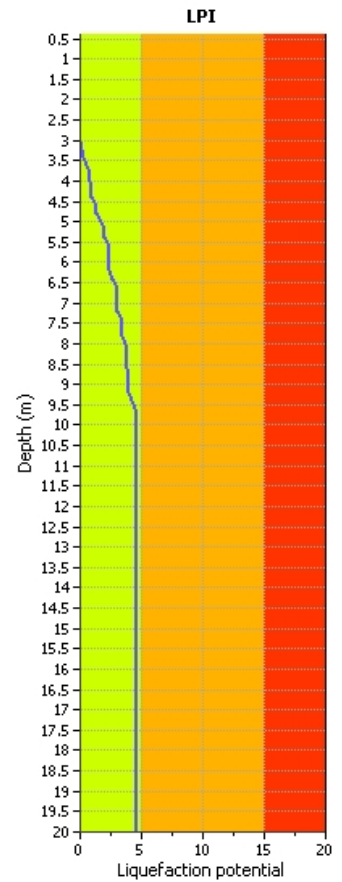
**Grafico 387 - 203010C216**



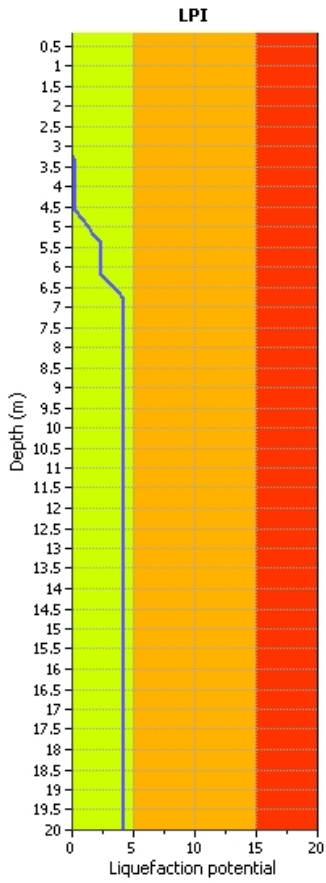
**Grafico 388 - 203010C217**



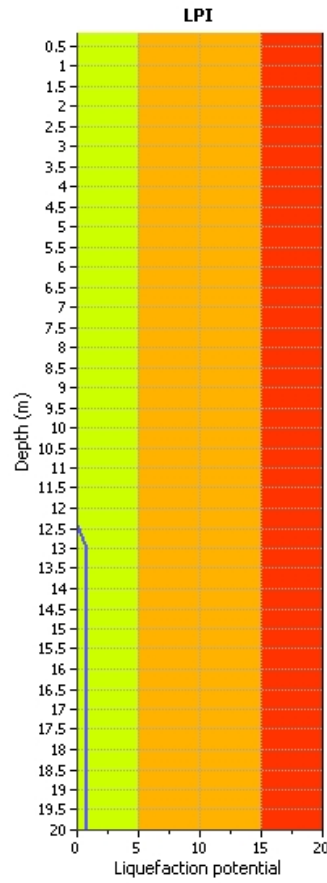
**Grafico 389 - 203010C222**



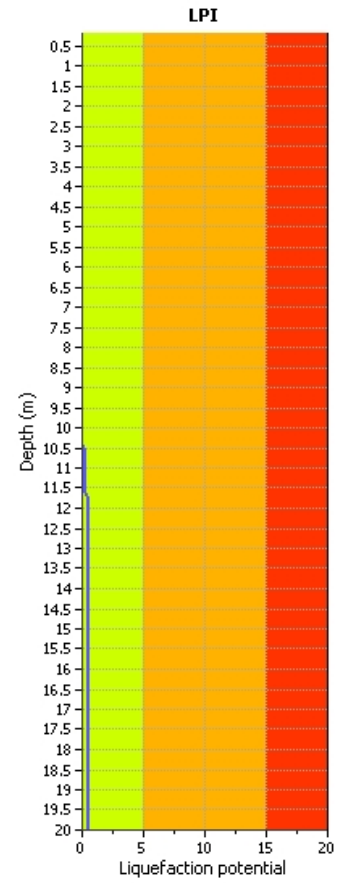
**Grafico 390 - 203010C223**



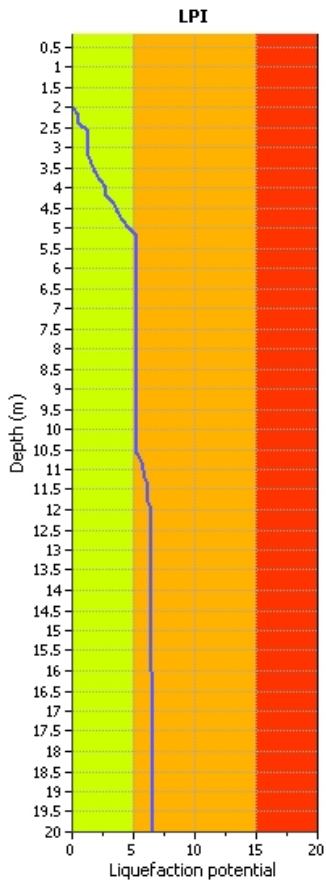
**Grafico 391 - 203010C224**



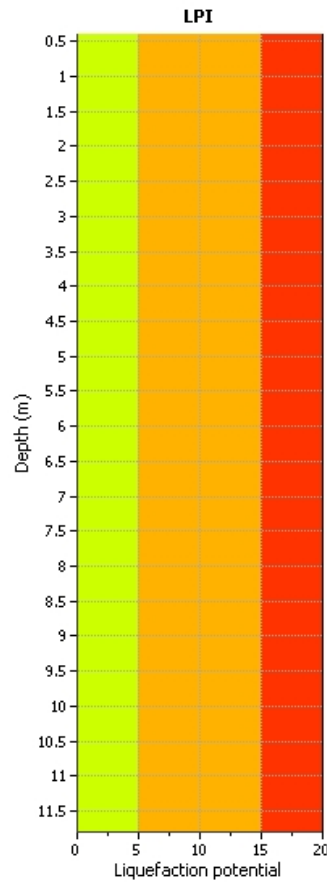
**Grafico 392 - 203010C225**



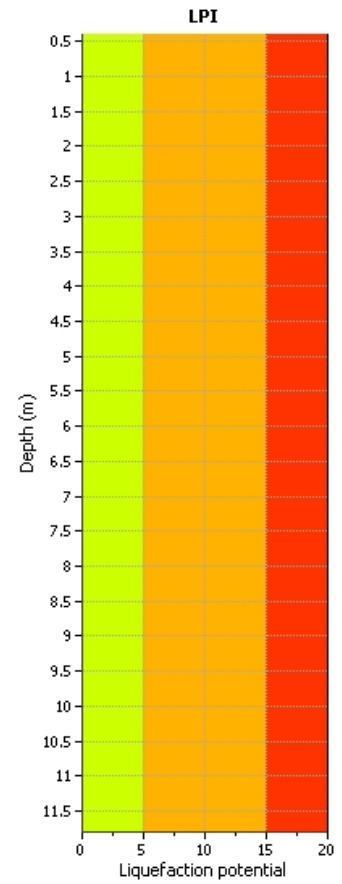
**Grafico 393 - 203010C226**



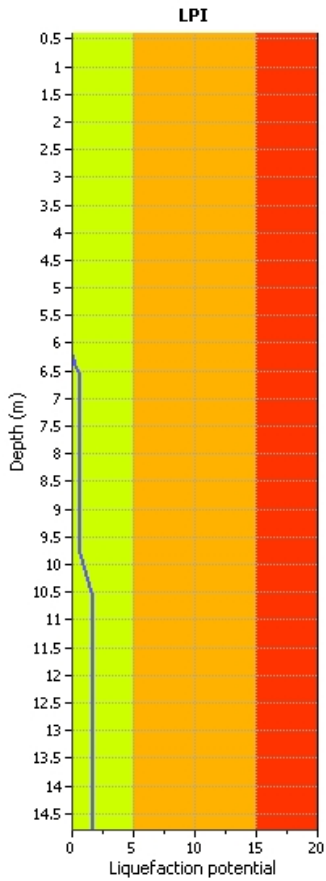
**Grafico 394 - 203010C227**



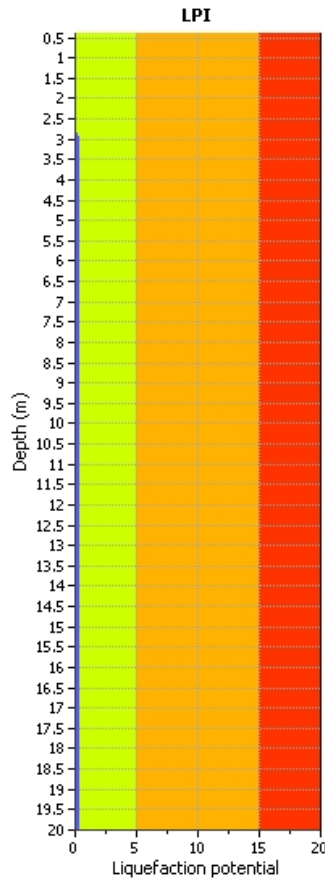
**Grafico 395 - 203010C228**



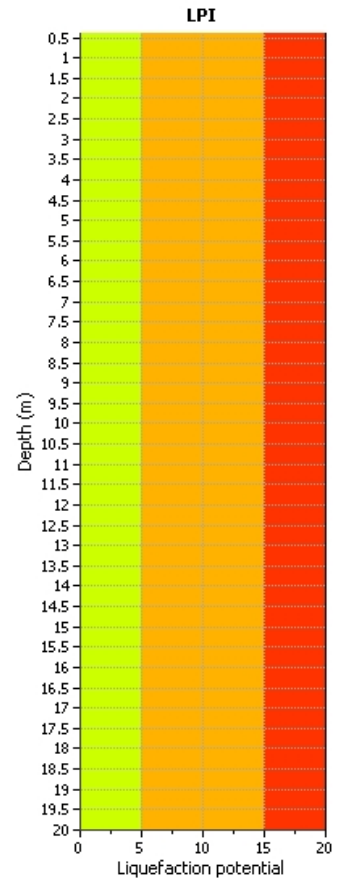
**Grafico 396 - 203010C229**



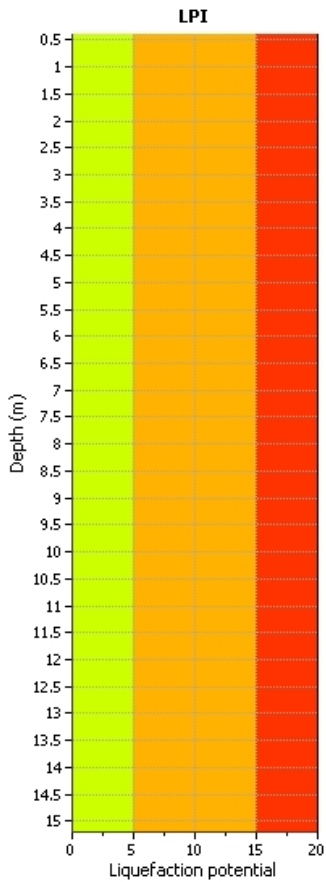
**Grafico 397 - 203010C230**



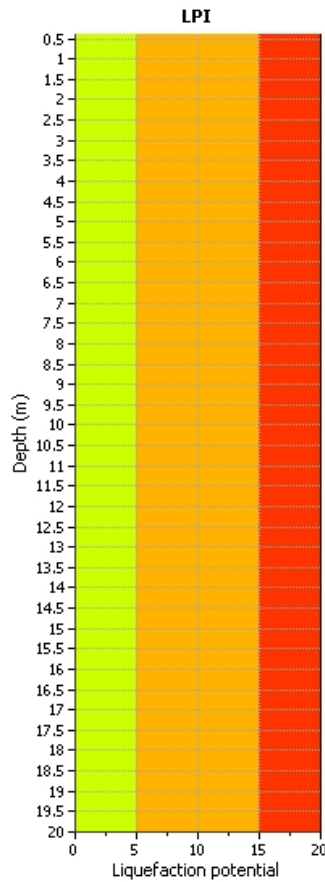
**Grafico 398 - 203010C231**



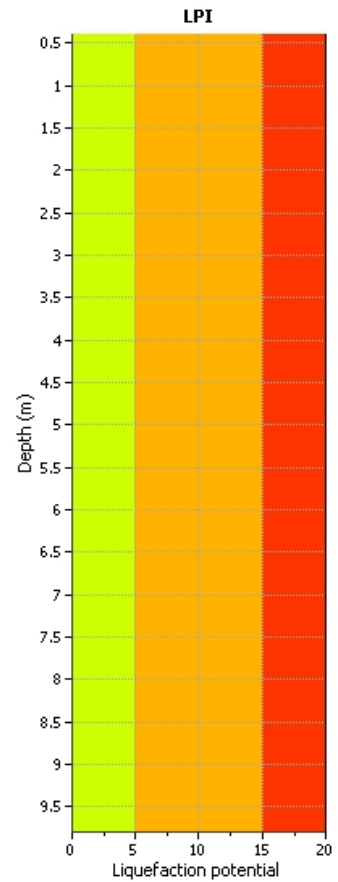
**Grafico 399 - 203010C232**



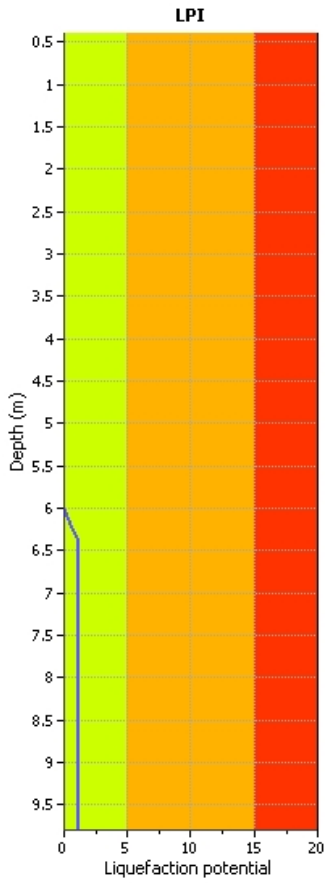
**Grafico 400 - 203010C233**



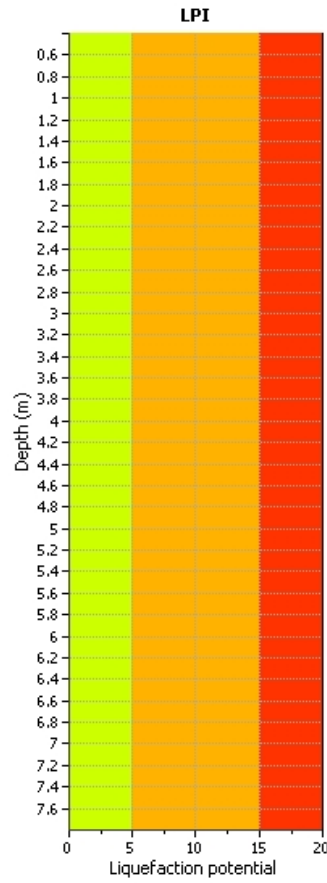
**Grafico 401 - 203010C234**



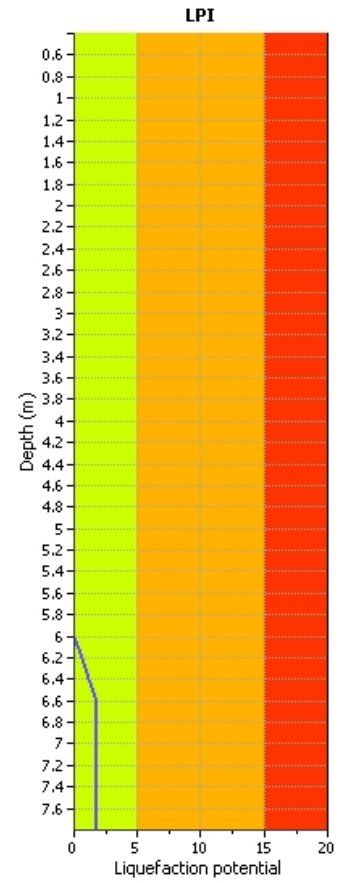
**Grafico 402 - 203010C235**



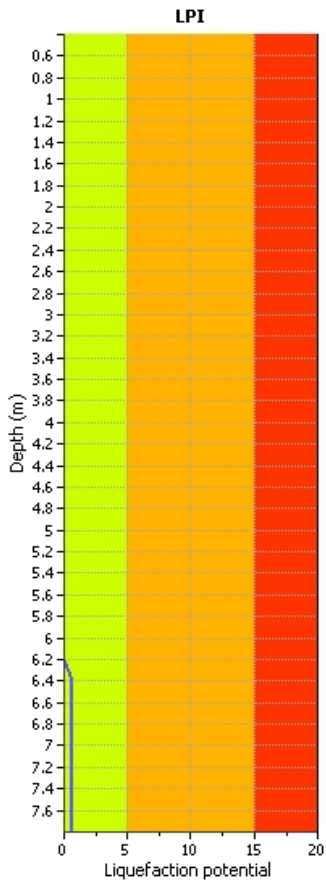
**Grafico 403 - 203010C236**



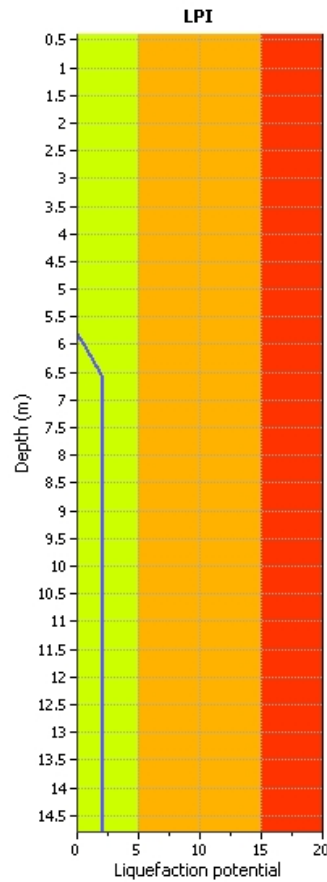
**Grafico 404 - 203010C237**



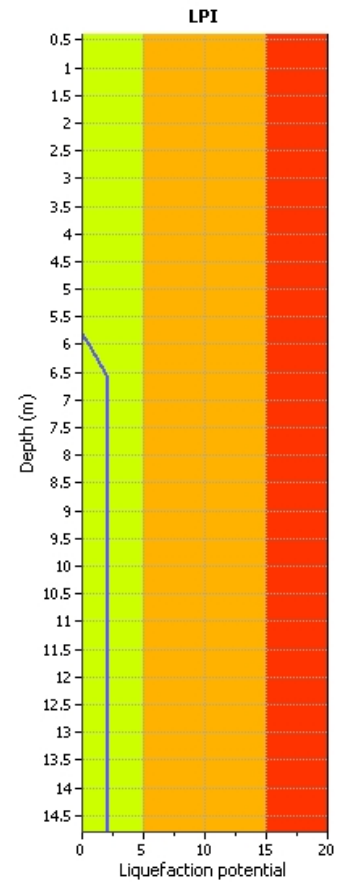
**Grafico 405 - 203010C238**



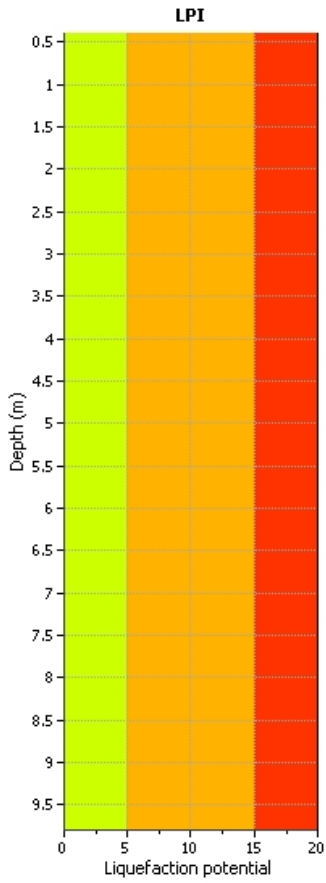
**Grafico 406 - 203010C239**



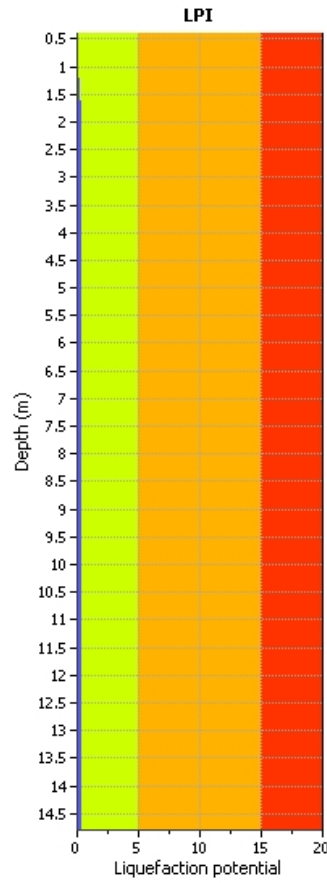
**Grafico 407 - 203010C240**



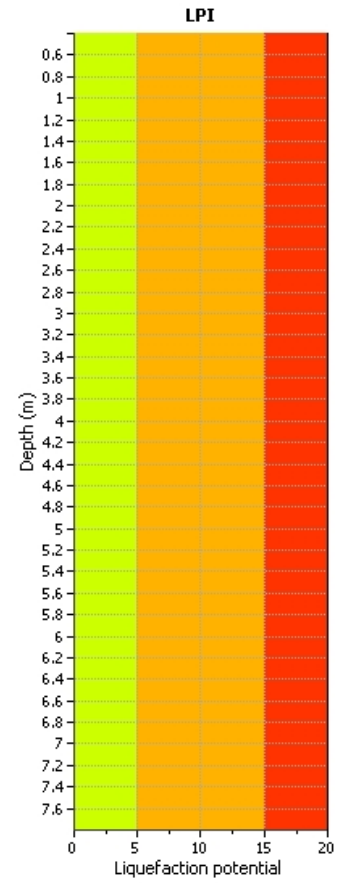
**Grafico 408 - 203010C241**



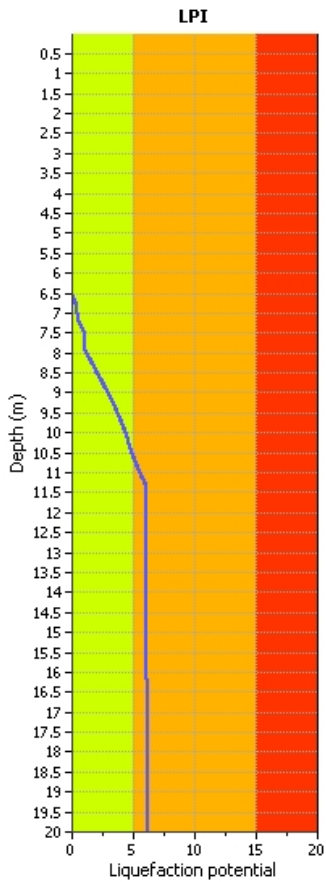
**Grafico 409 - 203010C242**



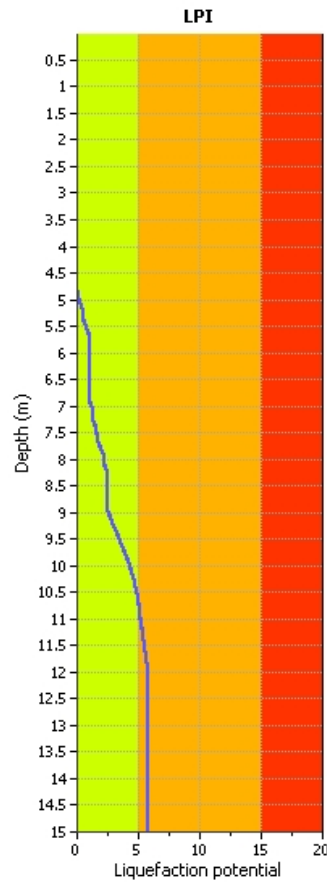
**Grafico 410 - 203010C243**



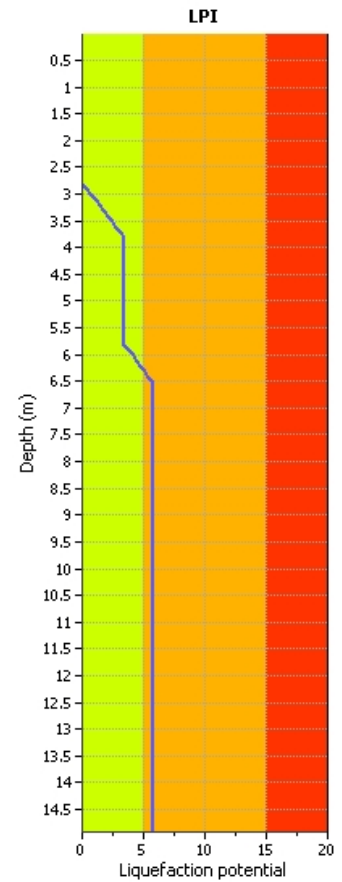
**Grafico 411 - 203010C244**



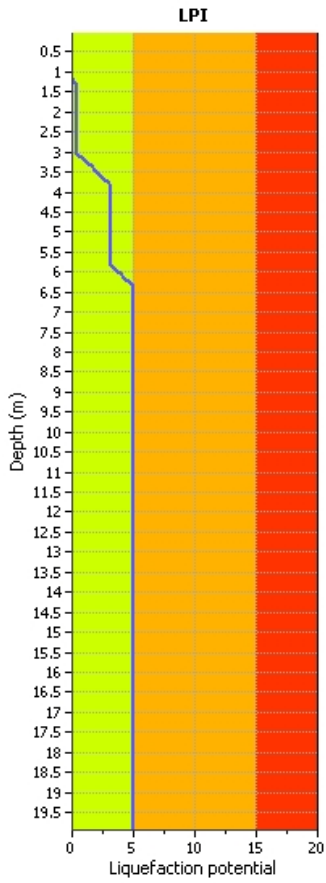
**Grafico 412 - 203010U001**



**Grafico 413 - 203010U002**

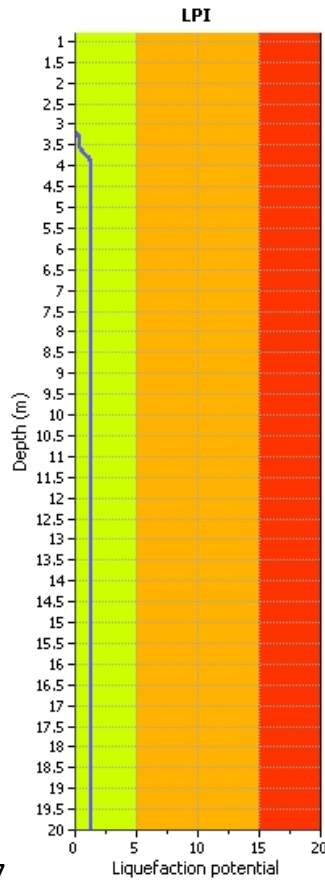


**Grafico 414 - 203010U005**

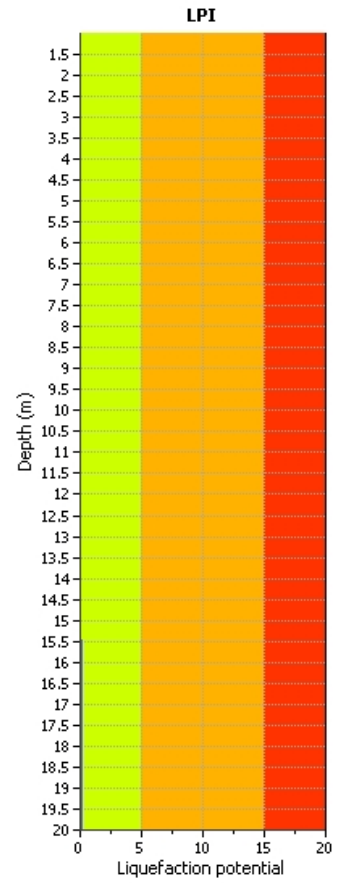


**Grafico 415 - 203010U006**

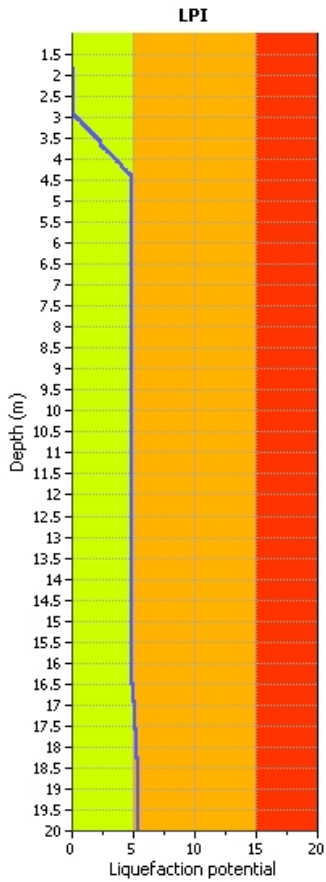
.7



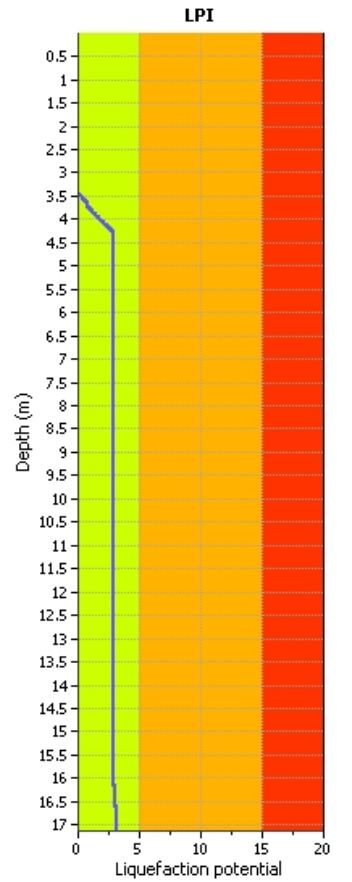
**Grafico 416 - 203010U007**



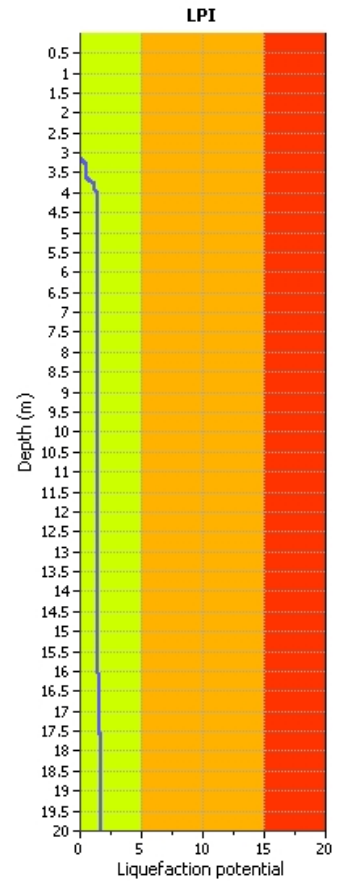
**Grafico 417 - 203010U008**



**Grafico 418 - 203010U009**

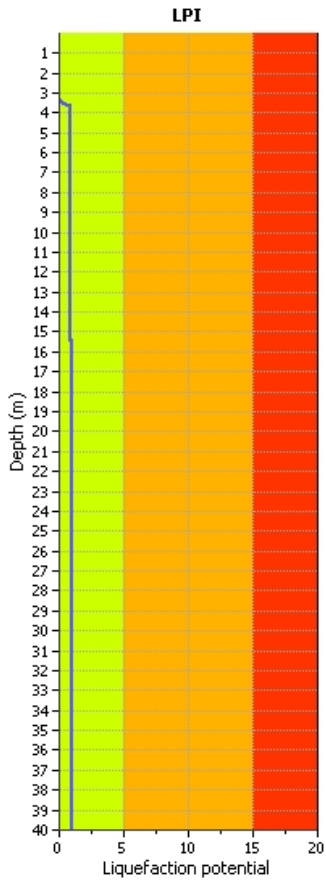


**Grafico 419 - 203010U010**

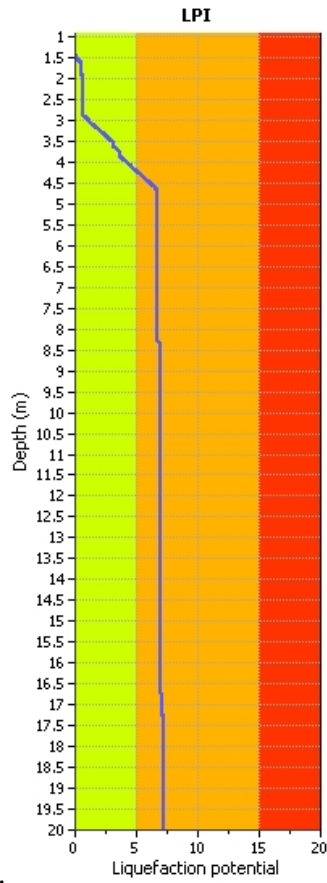


**Grafico 420 - 203010U011**

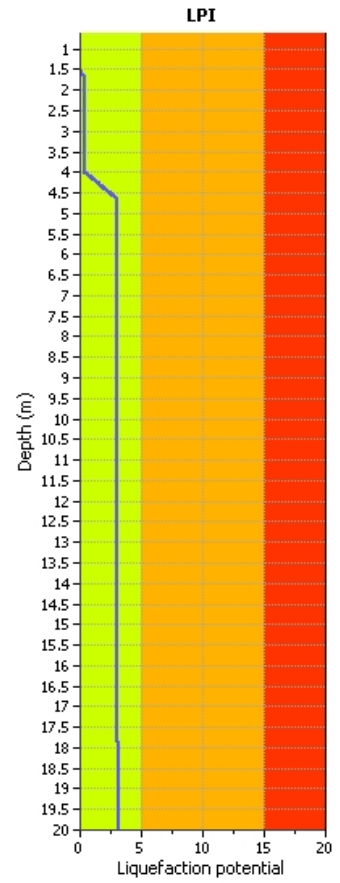




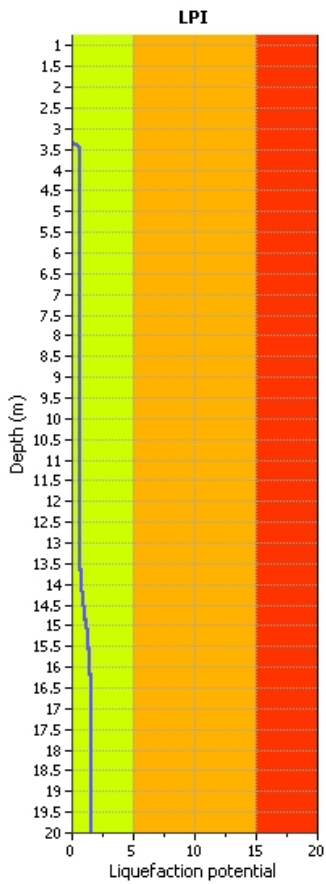
**Grafico 421 - 203010U012**



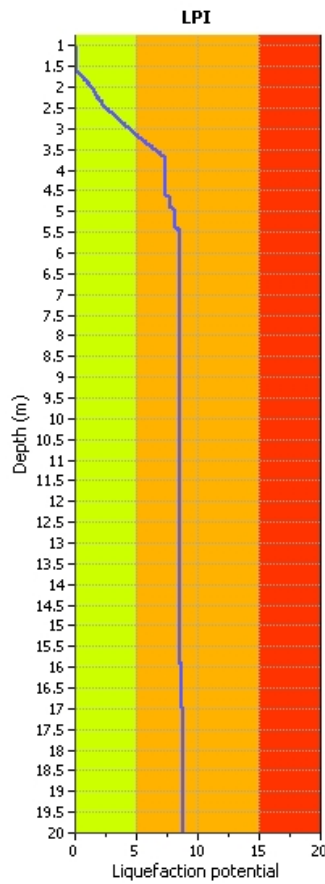
**Grafico 422 - 203010U013**



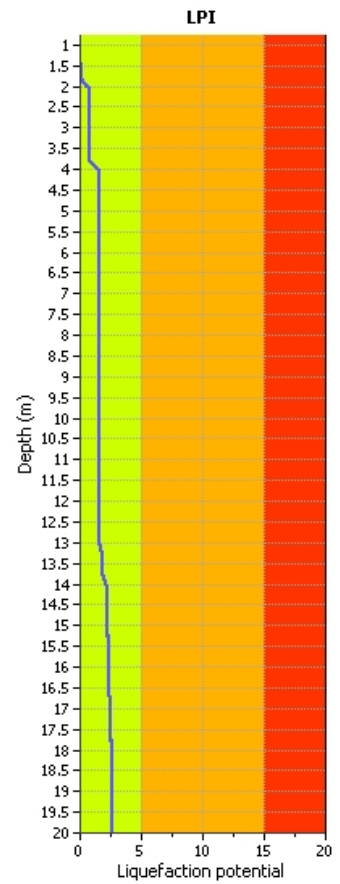
**Grafico 423 - 203010U014**



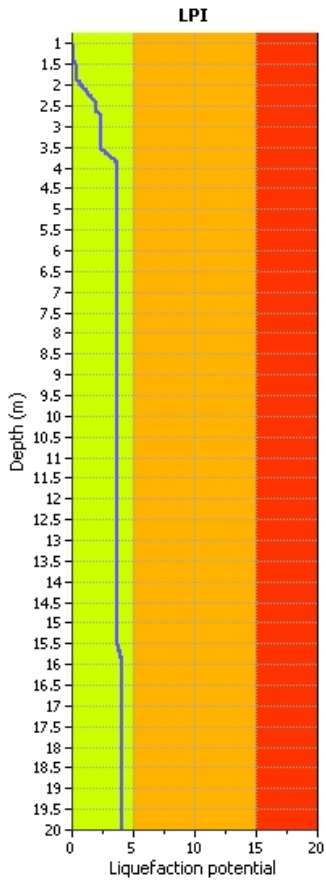
**Grafico 424 - 203010U501**



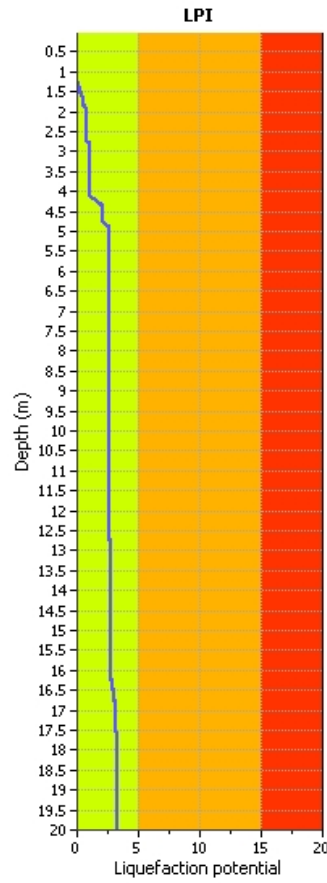
**Grafico 425 - 203010U502**



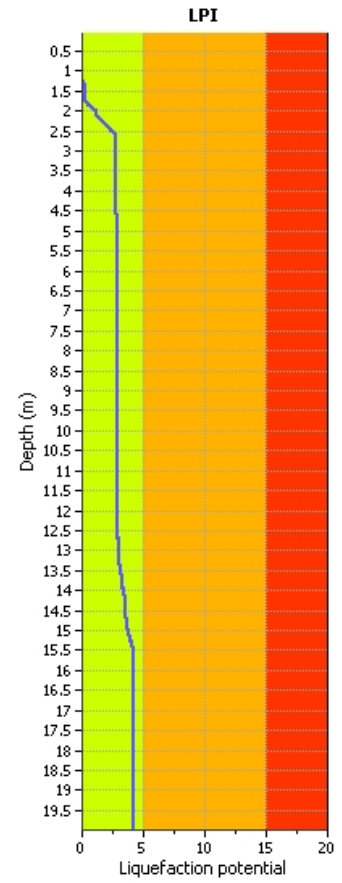
**Grafico 426 - 203010U504**



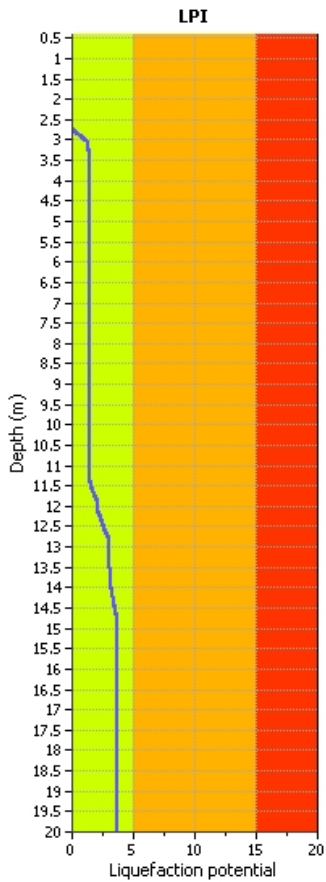
**Grafico 427 - 203010U505**



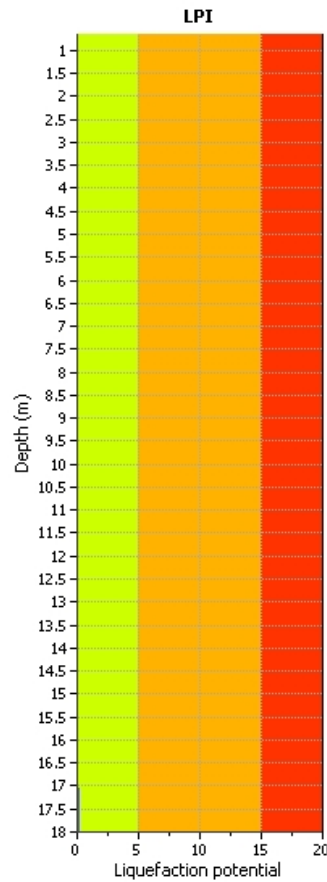
**Grafico 428 - 203010U508**



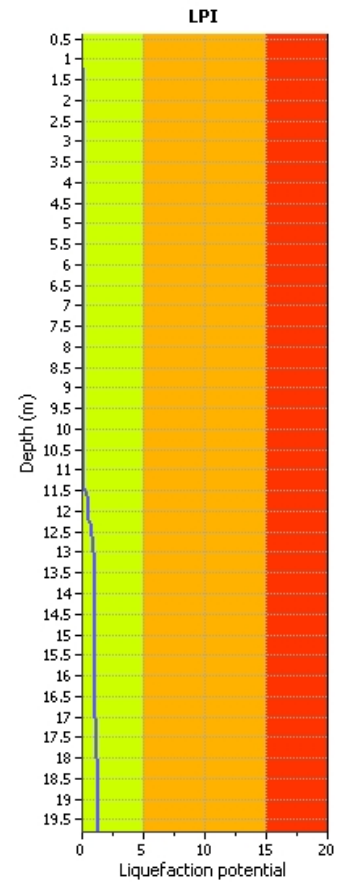
**Grafico 429 - 203010U509**



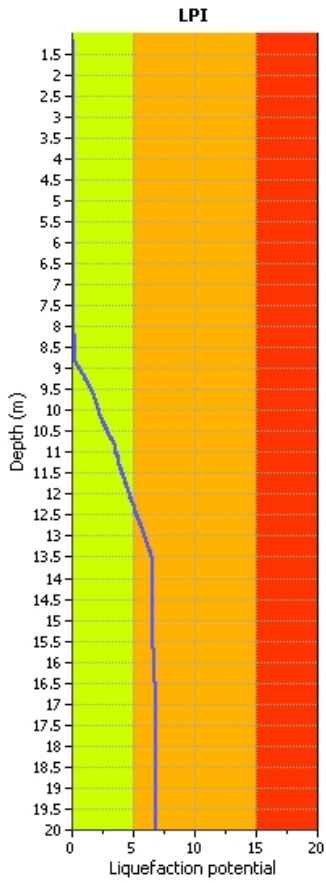
**Grafico 430 - 203010U993**



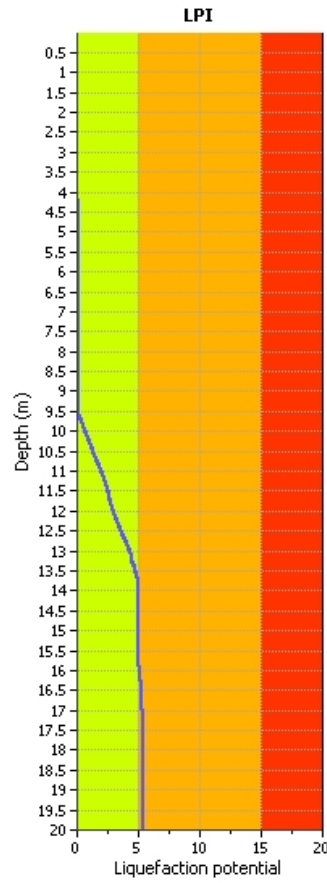
**Grafico 431 - 203020C063**



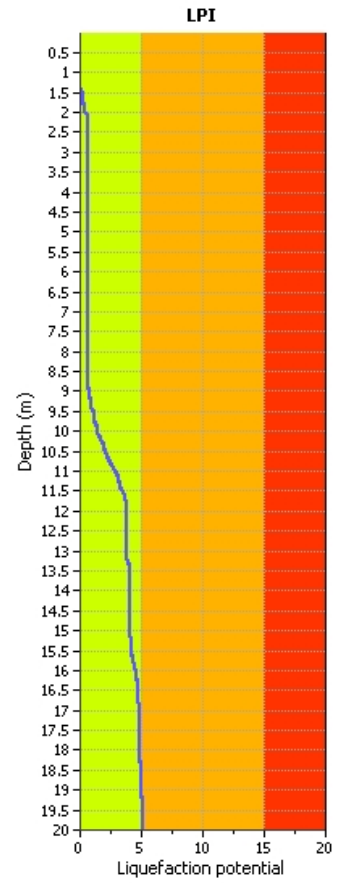
**Grafico 432 - 203020C064**



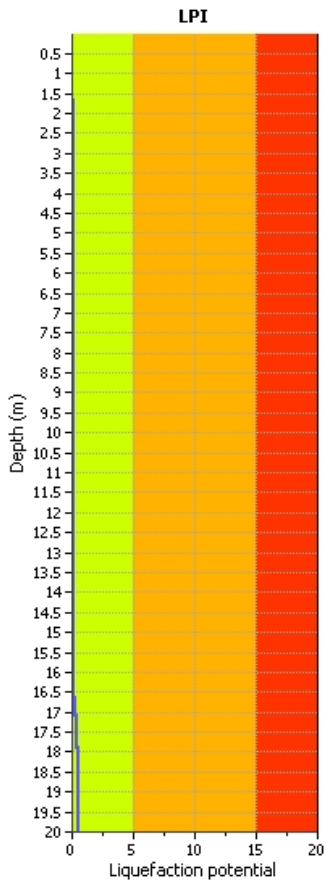
**Grafico 433 - 203020U095**



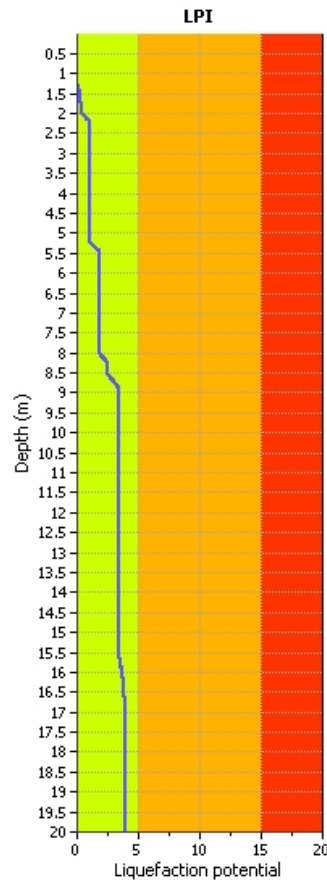
**Grafico 434 - 203020U096**



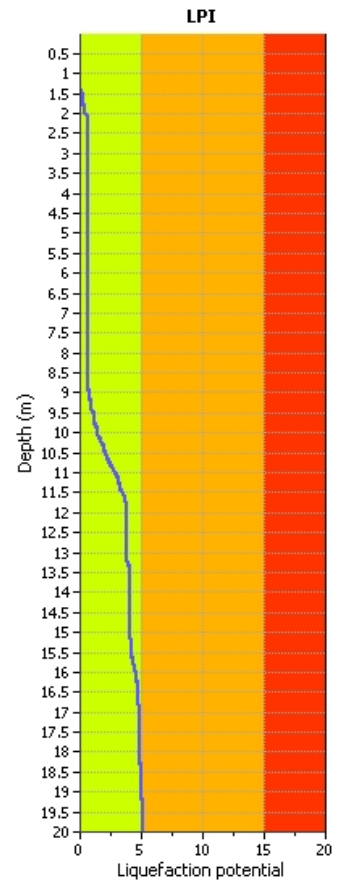
**Grafico 435 - 203020U097**



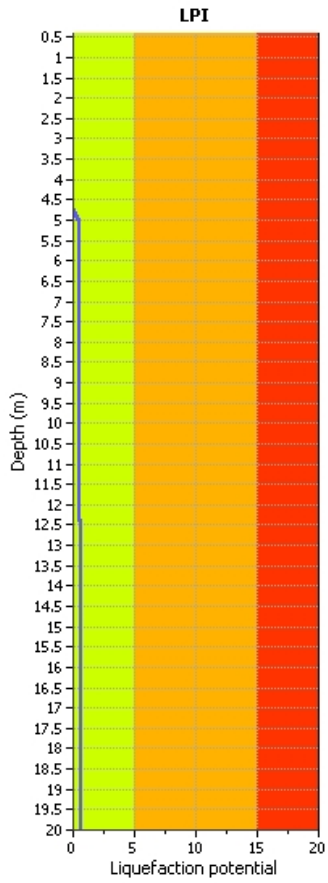
**Grafico 436 - 203020U098**



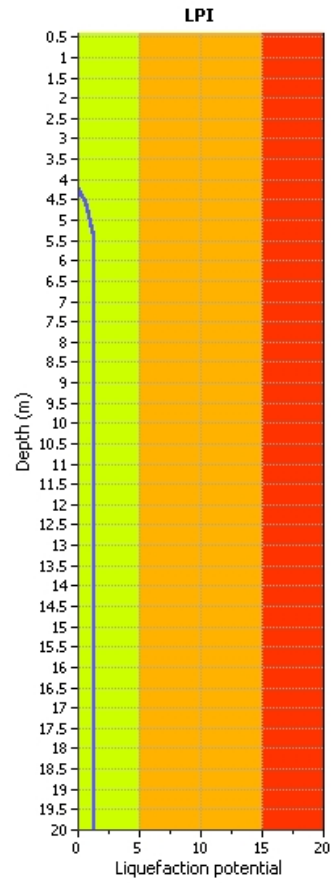
**Grafico 437 - 203020U099**



**Grafico 438 - 185130U999**



**Grafico 439 - 203010U991**



**Grafico 440 - 203010U992**

## Riferimenti bibliografici

- Begemann H.K.S. (1965): The friction jacket cone as an aid in determining the soil profile. 6th Int. Conf. Soil Mechanics and Foundation Engineering, ICSMFE, Montreal, September 8-15, *Proceed.*, **2**, 17-20.
- Cestari F. (2009): “Prove geotecniche in sito”, 3. Ed. Segrate Geo-Impianti, 415 pp.;
- Douglas B.J. e Olsen R.S. (1981): Soil classification using electric cone penetrometer. Am. Soc. Civil Eng., ASCE, Proc. Conf. Cone Penetration Testing and Experience, St. Louis, October 26-30, 209-227.
- Facciorusso J. (2008): Calcolo del potenziale di liquefazione su vasta scala: approccio deterministico e approccio probabilistico. Incontro Annuale dei Ricercatori di Geotecnica, IARG, Catania, 15-17 Settembre.
- Idriss I.M. e Boulanger R. W. (2008): Soil liquefaction during earthquake. Earthquake Engineering Research Institute, EERI Publication MNO-12.
- Iwasaki T., Tokida K., Tatsuoka F., Watanabe S., Yasuda S. e Sato H. (1982): Microzonation for soil liquefaction potential using simplified methods. 3rd Int. Earthq. Microzonation Conf., Seattle, *Proceed.*, 1319-1330.
- Jefferies M.G. e Davies M. P. (1993): Use of CPTu to estimate equivalent SPT N60. *Geotech. Testing J.*, ASTM, 16(4), 458-468.
- Robertson P.K., Campanella D., Gillespie D. e Greig J. (1986): Use of Piezometer Cone data. In-Situ'86 Use of In-situ testing in Geotechnical Engineering, GSP 6, ASCE, Reston, VA, Specialty Publication, pp. 1263-1280;
- Robertson P.K. (1990): Soil classification using the cone penetration test. *Can. Geotech. J.*, **27**(1), 151-158.
- Robertson P.K. e Wride C.E. (1998): Evaluating cyclic liquefaction potential using the cone penetration test. *Can. Geotech. J.*, **35**, 442-459.
- Robertson P.K. e Cabal K.L. (2010): Estimating soil unit weight from CPT. 2nd Int. Symp. Cone Penetration Testing, Huntington Beach, CA, USA.
- Schmertmann J. H. (1978): Guidelines for Cone Penetration Test, Performance and Design. Report No. FHWA-TS-78-209, U.S. Dept. Transportation, Washington, D.C., pp. 145.
- Sonmez H. (2003): Modification to the liquefaction potential index and liquefaction susceptibility mapping for aliuefaction-prone area (Inegol-Turkey). *Environ. Geol.*, **44**(7),862–871.