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Lampiran 1 Hasil pengukuran dampak peledakan pada jarak kurang dari 500 meter dari lokasi peledakan

No.	Jarak Pengukuran (m)	Getaran Tanah (mm/s)	NAB SNI 7571 (mm/s)**	Ledakan Udara (db)	NAB SNI 7570 (db)	Flyrock (meter)	NAB Flyrock (meter)***
1	300	3,72	3,00	81,00	110,00	37	150
2	500	1,34	3,00	72,80	110,00	32	150
3	486	1,54	3,00	82,60	110,00	43	150
4	296	3,32	3,00	92,10	110,00	46	150
5	272	4,18	3,00	73,60	110,00	38	150
6	275	3,78	3,00	82,66	110,00	31	150
7	280	3,67	3,00	70,53	110,00	48	150
8	462	1,63	3,00	79,00	110,00	32	150
9	272	4,16	3,00	91,01	110,00	41	150
10	272	4,28	3,00	87,63	110,00	31	150
11	275	3,75	3,00	73,00	110,00	35	150
12	280	3,68	3,00	70,70	110,00	26	150
13	293	3,52	3,00	72,89	110,00	40	150
14	292	3,72	3,00	97,44	110,00	32	150
15	287	3,65	3,00	74,58	110,00	30	150
16	294	3,43	3,00	92,87	110,00	31	150
17	300	3,72	3,00	64,50	110,00	42	150
18	300	3,89	3,00	89,76	110,00	29	150
19	274	3,81	3,00	90,14	110,00	47	150
20	272	3,94	3,00	76,67	110,00	45	150
21	274	4,51	3,00	87,98	110,00	43	150
22	275	4,69	3,00	98,55	110,00	47	150
23	389	2,21	3,00	82,24	110,00	46	150
24	281	4,26	3,00	89,54	110,00	44	150
25	287	3,45	3,00	86,92	110,00	41	150
26	298	3,34	3,00	82,00	110,00	29	150
27	423	2,32	3,00	94,30	110,00	31	150
28	300	3,42	3,00	69,45	110,00	44	150
29	293	3,53	3,00	70,43	110,00	31	150
30	284	3,60	3,00	91,00	110,00	37	150
31	286	3,66	3,00	86,82	110,00	26	150
32	472	1,82	3,00	89,96	110,00	37	150
33	287	3,54	3,00	73,34	110,00	30	150
34	293	3,43	3,00	90,43	110,00	41	150
35	482	1,84	3,00	76,34	110,00	37	150
36	296	3,87	3,00	71,65	110,00	42	150
37	298	3,87	3,00	74,54	110,00	39	150
38	300	3,67	3,00	68,32	110,00	41	150
39	392	2,51	3,00	68,05	110,00	45	150
40	295	3,89	3,00	69,56	110,00	41	150
		3,39	3,00	69,73	110,00	40	150
		4,23	3,00	70,78	110,00	38	150



Lampiran 2 Karakteristik batuan pit c2

Sample Code	Elevasi (meter)		Lithologi	A (mm ²)	Load (Kn)	UCS (Mpa)
	From	To				
DDGT-BE-19-05/UCS-01	6.7	6.85	Mudstone	2853.9	1.95	0.68
DDGT-BE-19-05/UCS-02	7.05	7.2	Mudstone	2851	3.28	1.15
DDGT-BE-19-05/UCS-03	7.5	7.65	Mudstone	2789.9	7.48	2.68
DDGT-BE-19-05/UCS-04	7.65	7.8	Mudstone	2735.8	5.72	2.09
DDGT-BE-19-05/UCS-05	16.3	16.45	Mudstone	2882.7	11.25	3.98
DDGT-BE-19-05/UCS-06	19.45	19.6	Mudstone	2735.8	12.29	4.49
DDGT-BE-19-05/UCS-07	32.5	32.65	Sandstone	2642.1	34.48	13.05
DDGT-BE-19-05/UCS-08	58.55	58.7	Mudstone	2943.6	18.62	6.33
DDGT-BE-19-05/UCS-09	77.85	78	Mudstone	2715.5	55.97	20.61
DDGT-BE-19-05/UCS-10	78.7	78.85	Mudstone	2960	73.22	24.74
DDGT-BE-19-05/UCS-11	83.3	83.45	Mudstone	2928.2	10.89	3.72
DDGT-BE-19-05/UCS-12	98.2	98.35	Mudstone	2821.8	31.53	11.17
DDGT-BE-19-05/UCS-13	98.35	98.5	Mudstone	2957.1	39.17	13.24
DDGT-BE-19-05/UCS-14	132.85	133	Mudstone	3075.8	7.64	2.48
DDGT-BE-19-06/UCS-01	53.65	53.80	Mudstone	2865.3	54.68	19.08
DDGT-BE-19-06/UCS-02	53.80	53.95	Mudstone	2872.9	58.79	20.47
DDGT-BE-19-06/UCS-03	58.60	58.75	Sandstone	2906.2	57.78	19.88
DDGT-BE-19-06/UCS-04	58.75	58.90	Sandstone	2915.8	78.48	26.92
DDGT-BE-19-06/UCS-05	102.00	102.15	Sandstone	2945.5	62.68	21.28
DDGT-BE-19-06/UCS-06	108.00	108.15	Sandstone	2911.9	98.61	33.87
DDGT-BE-19-06/UCS-07	134.20	134.35	Sandstone	2955.1	24.12	8.16
DDGT-BE-19-07/UCS-01	8.80	8.95	Sandstone	2941.7	61.37	20.86
DDGT-BE-19-07/UCS-02	60.80	60.95	Sandstone	2784.8	40.84	14.67
DDGT-BE-19-07/UCS-03	60.95	61.10	Sandstone	2874.8	65.35	22.73
DDGT-BE-19-07/UCS-04	83.60	83.75	Mudstone	2836.9	72.59	25.59
DDGT-BE-19-07/UCS-05	88.70	88.85	Sandstone	2903.3	84.81	29.21
DDGT-BE-19-07/UCS-06	97.40	97.55	Sandstone	2918.6	33.67	11.54



Lampiran 3 Perbandingan nilai analisis getaran tanah aktual dan metode regresi linear pada jarak lebih dari 500 meter

Jarak (m)	Isian (kg)	SD= $D/\sqrt{W}$	PPV Analisis Regresi Linear (mm/s)	PPV Aktual (mm/s)	Deviasi Regresi Linear (%)	Deviasi Regresi Linear (%)
642	50	90,79	1,06	1,110	-0,05	-4%
597	50	84,43	1,12	1,230	-0,11	-9%
704	50	99,56	0,99	0,950	0,04	4%
620	50	87,68	1,09	1,115	-0,03	-2%
665	50	94,05	1,04	1,070	-0,03	-3%
580	50	82,02	1,14	1,390	-0,25	-18%
676	50	95,60	1,02	1,050	-0,03	-2%
705	50	99,70	0,99	0,950	0,04	4%
638	50	90,23	1,07	1,150	-0,08	-7%
632	50	89,38	1,08	1,160	-0,08	-7%
502	50	70,99	1,23	1,640	-0,41	-25%
607	50	85,84	1,10	1,190	-0,09	-7%
625	50	88,39	1,08	1,190	-0,11	-9%
644	50	91,08	1,06	1,140	-0,08	-7%
579	50	81,88	1,14	1,350	-0,21	-16%
568	50	80,33	1,15	1,420	-0,27	-19%
731	51	102,36	0,97	0,920	0,05	5%
561	52	77,80	1,17	1,480	-0,31	-21%
603	53	82,83	1,13	1,300	-0,17	-13%
530	54	72,12	1,22	1,610	-0,39	-24%
568	55	76,59	1,18	1,470	-0,29	-20%
630	56	84,19	1,12	1,270	-0,15	-12%
678	57	89,80	1,07	1,160	-0,09	-8%
728	58	95,59	1,02	1,050	-0,03	-2%
615	59	80,07	1,15	1,390	-0,24	-17%
672	60	86,75	1,10	1,210	-0,11	-9%
734	61	93,98	1,04	1,050	-0,01	-1%
964	62	122,43	0,80	0,680	0,12	18%
626	63	78,87	1,16	1,410	-0,25	-18%
641	64	80,13	1,15	1,420	-0,27	-19%
585	65	72,56	1,21	1,630	-0,42	-26%
664	66	81,73	1,14	1,430	-0,29	-20%
584	67	71,35	1,22	1,720	-0,50	-29%



Lampiran 4 Pengukuran hasil analisis getaran peledakan dengan metode *signature hole* dan aktual pada jarak lebih dari 500 meter

Jarak (m)	Isian (kg)	SD= $D/\sqrt{W}$	PPV Analisis Signature Hole (mm/s)	PPV Actual (mm/s)	Deviasi SHA (mm/s)	Deviasi SHA (%)
642	50	90,79	1,12	1,110	0,009	1%
597	50	84,43	1,25	1,230	0,018	1%
704	50	99,56	0,97	0,950	0,024	3%
620	50	87,68	1,18	1,115	0,064	6%
665	50	94,05	1,06	1,070	-0,009	-1%
580	50	82,02	1,30	1,390	-0,087	-6%
676	50	95,60	1,04	1,050	-0,014	-1%
705	50	99,70	0,97	0,950	0,022	2%
638	50	90,23	1,13	1,150	-0,021	-2%
632	50	89,38	1,15	1,160	-0,014	-1%
502	50	70,99	1,62	1,640	-0,022	-1%
607	50	85,84	1,22	1,190	0,027	2%
625	50	88,39	1,16	1,190	-0,025	-2%
644	50	91,08	1,11	1,140	-0,026	-2%
579	50	81,88	1,31	1,350	-0,044	-3%
568	50	80,33	1,34	1,420	-0,075	-5%
731	51	102,36	0,93	0,920	0,015	2%
561	52	77,80	1,41	1,480	-0,069	-5%
603	53	82,83	1,28	1,300	-0,016	-1%
530	54	72,12	1,58	1,610	-0,030	-2%
568	55	76,59	1,44	1,470	-0,026	-2%
630	56	84,19	1,25	1,270	-0,017	-1%
678	57	89,80	1,14	1,160	-0,023	-2%
728	58	95,59	1,04	1,050	-0,014	-1%
615	59	80,07	1,35	1,390	-0,039	-3%
672	60	86,75	1,20	1,210	-0,012	-1%
734	61	93,98	1,06	1,050	0,012	1%
964	62	122,43	0,71	0,680	0,035	5%
626	63	78,87	1,38	1,410	-0,028	-2%
641	64	80,13	1,35	1,420	-0,070	-5%
585	65	72,56	1,57	1,630	-0,064	-4%
664	66	81,73	1,31	1,430	-0,120	-8%
584	67	71,35	1,61	1,720	-0,114	-7%



Lampiran 5 Detail perhitungan gataran tanah per radius

$$PPV = K_v \left(\frac{R}{\sqrt{Q}} \right) - B_v$$

dimana :

- PPV : Kecepatan partikel puncak (mm/s) maksimal 3,0 mms
- R : Jarak lokasi peledakan terhadap lokasi pengamatan/radius (m)
- W : Muatan bahan peledak per waktu tunda sesuai radius (kg)
- K_v : Konstanta batuan terkait berat bahan peledak (968)
- B_v : Konstanta batuan terkait jarak terhadap lokasi peledakan (1,5)

Getaran peledakan radius 500-400 meter

$$PPV = K_v \left(\frac{R}{\sqrt{Q}} \right) - B_v$$

$$PPV = 968 \left(\frac{400}{\sqrt{60}} \right) - 1,5$$

$$PPV = 2,61 \text{ mm/s}$$

Getaran peledakan radius 400-300 meter

$$PPV = K_v \left(\frac{R}{\sqrt{Q}} \right) - B_v$$

$$PPV = 968 \left(\frac{300}{\sqrt{35}} \right) - 1,5$$

$$PPV = 2,68 \text{ mm/s}$$

Getaran peledakan radius 300-200 meter

$$PPV = K_v \left(\frac{R}{\sqrt{Q}} \right) - B_v$$

$$PPV = 968 \left(\frac{200}{\sqrt{15}} \right) - 1,5$$

$$PPV = 2,61 \text{ mm/s}$$

Getaran peledakan radius 200-150 meter

$$PPV = K_v \left(\frac{R}{\sqrt{Q}} \right) - B_v$$

$$PPV = 968 \left(\frac{150}{\sqrt{10}} \right) - 1,5$$

$$2,96 \text{ mm/s}$$



Lampiran 6 Perhitungan geometri menggunakan metode RL Ash

Persamaan perhitungan geometri menggunakan metode RL, Ash dapat dilihat pada persamaan berikut :

$$B = K_b \times De / 12 \times 0,3048;$$

$$S = K_s \times B \times 0.3048;$$

$$H = K_h \times B \times 0,3048;$$

dimana :

- B : Burden (Meter)
- S : Spacing (Meter)
- H : Kedalaman (Meter)
- De : Diameter lubang ledak (inch)
- K_s : Spacing ratio, Nilai konstanta 1,2 – 2
- K_b : Burden ratio, Nilai konstanta 30 - 45
- K_h : Hole length ratio, Nilai konstanta 0,8 – 4

Hasil perhitungan menggunakan persamaan di atas, dapat dilihat pada tabel berikut,

Radius (Meter)	Diameter lubang ledak (inch)	K_b	Burden (Meter)	K_s	Spacing (Meter)	K_h	H (Meter)
500-400	5,5	45	6,2865	1,2	7,5438	1,2	7,5438
400-300	5,5	45	6,2865	1,2	7,5438	0,8	5,0292
300-200	4,5	45	5,1435	1,2	6,1722	0,8	4,1148
200-150	3,5	45	4,0005	1,2	4,8006	0,8	3,2004



Lampiran 7 Pivot diagram waktu tunda peledakan

Min of PVS		Column Labels																																								
Row Labels		35	38	41	44	47	50	53	56	59	62	65	68	71	74	77	80	83	86	89	92	95	98	101	104	107	110	113	116	119	122	125	128	131	134	137	140	143	146	149	152	Grand Total
25		8.841	8.043	8.009	10.71	10.36	13.8	15.21	10.67	10.34	7.832	8.136	9.072	15.9	17.15	11.54	9.484	8.934	9.886	11.53	15.09	17.79	19.13	18.98	18.86	22.4	19.09	15.31	12.81	12.07	13.47	12.7	10.36	10.88	12.2	13.53	17.34	23.92	26.9	22.43	18.81	7.832
28		9.504	8.843	8.683	9.011	8.63	13.77	16.97	21	22.2	10.63	11.66	7.271	7.131	10.15	12.15	15.97	23.63	23.45	15.86	15.08	11.5	13.64	16	17.04	20.66	27	24.27	24.68	18.93	16.8	15.35	14.82	13.34	13.35	14.57	14.64	14.56	16.27	14.82	14.52	7.131
31		15.52	11.42	10.75	8.097	10.02	10.09	9.684	11.67	21.89	48.44	32.9	13.13	12.99	10.5	9.189	10.11	13.23	17.01	21.51	33.49	39.83	22.81	12.9	11.05	11.98	14.78	15.69	19.48	21.34	29.37	37.34	33.75	24.63	18.21	16.34	14.96	14.35	15.87	15.25	18.17	8.097
34		24.79	10.25	11.07	10.44	7.96	12.24	12.51	8.554	11.05	13.24	29.4	24.58	13.97	13.08	11.8	9.706	10.45	9.908	12.52	13.46	20.9	28.16	25.94	16.44	14.3	9.841	9.576	10.15	11.72	13.62	18	21.28	25.64	25.66	22.77	19.94	19.73	17.14	15.96	15.43	7.96
37		14.49	18.32	10.19	13.08	7.981	15.95	9.182	12.84	9.17	9.305	12.26	8.61	13.48	14.97	11.05	13.17	12.56	12.6	10.65	12.09	14.01	15.23	16.69	15.99	18.21	23.41	17.24	12.6	10.18	8.956	10.66	15.54	13.57	12.57	15.21	17.24	18.48	17.56	15.85	13.72	7.981
40		8.187	12.75	32.59	12.62	13.38	12.66	9.088	8.713	11.21	11.42	9.135	8.062	12.21	13.69	12.63	17.23	20.37	17.5	13.12	11.8	13.09	12.04	10.17	13.17	15.59	16.51	16.28	12.05	21.19	23.02	17.8	14.74	12.88	8.965	10.01	13.27	17.62	17.25	15.18	14.82	8.062
43		8.039	9.512	28.29	36.91	14.6	23.88	11.36	11.08	9.839	10.67	11.33	7.739	8.756	9.978	10.3	11.91	20.27	25.97	21.48	15.84	12.72	14.48	16.62	11.98	13.04	11.1	12.15	14.1	15.69	20.28	23.67	24.14	22.31	17.06	12.46	10.77	10.72	11.15	16.13	14.14	7.739
46		7.623	9.442	11.21	27.64	43.64	27.65	20.22	11.73	11.84	10.68	8.538	14.23	14.86	12.07	9.225	10.18	14.36	17.86	18.86	20.3	28.47	27.95	17.27	16.34	17.49	14.06	11.54	14.45	13.02	13.45	14.44	16.18	17.33	20.52	21.75	24.43	29.03	25.93	17.5	12.25	7.623
49		11.37	10.51	15.5	19.23	48.63	92.07	35.37	39.07	19.03	13.73	10.59	10.05	13.7	16.13	11.8	10.59	13.36	14.38	15.28	18.11	30.94	49.38	48.82	34.23	22.76	17.04	17.02	15.42	14.62	13.59	12.22	12.68	13.15	14.29	16.37	25.36	35.08	42.83	43.2	37.11	10.05
52		12.15	8.975	12.69	15.42	23.92	74.85	80.85	30.7	19.12	13.73	12.26	11.58	14.79	13.08	11.35	13.79	11.89	14.3	13.08	13.45	18.46	29.45	46.31	34.81	37.24	27.07	18.9	14.94	17.6	18.18	12.76	11.72	10.85	12.15	14.79	16.14	25.06	26.29	32.47	37.54	8.975
55		10.45	11.21	10.91	10.84	15.88	25.63	63.46	65.55	29.75	16.01	13.43	9.576	14.45	19.71	10.77	13.38	23.1	17.91	13.41	15.15	12.6	15.6	19.51	30.77	38.7	43.35	30.54	26	18.74	15.96	15.16	19.69	14.84	13.79	15.89	13.63	16.54	20.57	15.61	17.02	9.576
58		8.16	13.6	8.146	8.447	11.05	22.73	21.09	46.26	64.35	35.23	13.02	14.21	13.38	12.92	15.55	10	12.2	23.04	21.31	15.89	14.56	14.92	19.66	16.56	19.49	24.11	28.98	36.9	33.59	29.07	20.51	15.48	14.39	15.78	15.69	13.29	15.92	17.59	16.68	15.29	8.146
61		8.914	8.282	14.91	9.478	11.19	15.64	17.75	21.76	55.5	75.46	28.87	16.02	22.68	19.79	13.34	17.96	16.12	11.96	17.58	32.97	21.64	17.06	13.23	15.2	18.87	19.15	17.32	26.22	33.59	42.17	40.71	26.44	18.18	15.69	16.85	18.15	21.51	18.13	15.8	15.72	8.282
64		14.6	8.703	9.568	10.39	13.05	11.79	11.7	16.18	12.21	61.46	59.3	23.94	17.88	25.72	19.24	11.92	15.59	21.5	14.26	17.52	39.66	29.69	15.22	12.67	13.15	15.86	14.48	23.4	30.53	40.92	40.52	26.48	16.12	18.59	20.74	18.02	19.9	19.32	20.76	17.74	8.703
67		16.75	8.657	9.259	14.78	8.85	15.66	12.84	9.995	15.55	23.97	37.51	51.08	52.96	26.4	20.16	17.88	14.58	13.35	21.54	17.55	13.71	21.34	26.14	16.28	15.38	13.46	12.44	13.54	15.4	15.21	20.18	22.02	27.71	28.96	29.68	37.17	33.95	22.17	15.73	16.17	8.657
70		19.47	7.918	9.685	9.172	13.22	12.93	12.71	14	15.53	20.45	22.38	54.47	105.1	74.1	32.45	22.55	26.29	19.02	15.93	20.53	17.45	13.15	13.89	18.51	19.49	18.65	14.26	14.7	15.05	17.22	17.07	16.16	18.26	22.87	35.23	51.33	56.94	49.84	35.86	23.09	7.918
73		13.38	12.04	11.07	9.145	11.4	16.15	12.98	12.51	17.09	18.57	21.25	38.69	95.92	111.4	61.16	35.01	30.06	29.48	21.36	19.59	14.67	20.11	15.49	14.02	15.59	22.24	17.41	15.56	15.11	16.69	16.66	18.81	16.87	20.3	27.88	42.68	56.92	63.44	55.62	42.5	9.145
76		8.757	17.54	10.87	9.482	9.848	14.29	12.15	11.6	13.08	17.81	15.17	23.65	53.29	97.72	91.77	53.78	34.02	27.1	27.12	20.17	15.57	14.74	18.62	15.91	13.58	13.22	17.27	17.03	15.74	14.41	17.31	14.15	13.6	15.58	19.05	26.84	38.53	53.14	56.64	53.03	8.757
79		10.56	12.4	17.33	10.57	11.43	12.2	16.72	10.11	14.75	14.15	12.46	21.27	28.51	55.67	78.23	86.79	75.66	39.21	26.77	24.86	22.02	17.8	17.53	20.2	20.21	15.91	11.71	12.94	22.53	20.03	15.53	12.67	11.25	13.82	16.98	18.46	22.71	27.28	36.93	42.52	10.11
82		12.45	9.857	35.33	13.35	12.1	11.67	15.88	15.09	13.13	16.39	14.15	14.81	25.58	33.04	44.98	87.71	116.6	81.91	40.64	28.07	23.78	22.94	15.5	18.26	22.08	27.26	16.21	13.02	14.45	23.54	24.19	16.83	13.55	13.93	18.22	16.3	21.74	20.01	20.91	23.53	9.857
85		11.32	13.21	23.33	26.16	14.89	13.75	13.11	21.19	14.27	14.25	13.24	19.07	21.12	32.37	32.78	55.12	103.1	116.5	75.03	41.65	29.35	24.47	23.14	21.04	20.22	18.69	23.72	20.26	15.78	14.76	21.23	25.34	18.24	14.13	14.5	17.62	19.08	20.85	21.25	19.6	11.32
88		13.32	12.02	11.27	36.48	15.58	13.96	15.23	11.42	35.11	14.87	14.12	14.56	17.87	23.94	26.17	34.88	64.01	100.9	106.9	71.68	44.26	28.88	27.1	21.55	22.53	20.85	17.64	24.86	22.68	14.79	15.08	18.31	23.26	19.91	17.06	16.11	19.04	21.07	20.53	18.43	11.27
91		11.58	10.43	12.31	23	19.79	16.45	12.72	11.67	15.7	25.06	13.46	14.67	16.61	18.41	19.57	23.86	62.02	110.1	112.3	77.96	43.11	28.5	28.49	29.54	24.24	20.87	17.9	19.62	29.15	19.11	17.73	15.22	17.97	20.14	20.14	18.33	21.67	20.43	20.16	10.43	
94		15.69	12.98	12.19	13.27	42.81	22.62	17.11	16.66	15.17	43.22	20.39	14.89	14.91	16.48	16.98	21.9	25	38.29	62.14	107.6	110	74.83	46.14	33.29	26.96	31.69	24.92	18.94	19.24	21.41	37.88	24.44	18.77	15.13	15.8	23.17	31.3	26.43	20.36	18.27	12.19
97		17.47	14.1	14.29	18.07	43.25	48.94	19.45	13.58	14.9	17.05	41.92	12.9	15.87	15.59	15.77	16.64	25.97	26.6	37.81	67.38	95.79	121	82.67	51.96	36.93	28.5	30.84	24.33	18.7	20.56	18.82	34.15	26.25	17.19	16.71	16.12	31.72	42.56	32.77	22.78	12.9
100		16.91	15.61	13.63	16.43	23.69	79.85	30.38	17.87	16.56	14.22	21.1	20.17	13.81	17.9	15.01	20.42	18.64	26.26	27.68	36.53	65.2	113.4	140.9	99.22	61.73	39.66	30.91	28	25.41	19.68	18.88	20.23	23.58	25.34	19.13	16.99	18.74	27.53	42.99	39.19	13.63
103		19.44	16.16	12.93	15.36	20.98	55.21	54.87	19.4	15.44	16.38	13.88	21.75	15.3	16.02	16.31	21.06	18.99	21.33	25.25	28.29	41.93	65.23	128.8	144	111.6	67.66	43.91	31.67	26.67	26.26	21.53	20.07	20.83	19.09	22.76	20.45	18.17	17.75	24.43	36.77	12.93
106		17.16	14.85	15.29	13.89	22.79	27.36	70.95	24.11	17.88	14.83	13.31	14.14	19.3	16.48	14.27	18.35	18.28	20.92	23.57	25.12	33.06	47.07	76.09	131	150.4	116.6	65.12	43.62	32.98	27.72	28.4	25.61	23.7	20.96	19.73	20.93	21.51	20.12	18.87	20.48	13.31
109		17.14	14.51	16.98	13.14	15.47	18.39	45.4	41.16	16.78	17.2	14.71	14.14	15.68	15.98	15.57	13.91	22.81	19.12	21.08	23.37	26.7	34.23	50.49	87.37	138.1	153.7	105.6</														



**Lampiran 8 Pengukuran hasil analisis getaran peledakan dengan metode
signature hole, regresi linear, dan aktual**

Jarak (meter)	Isian (kg)	PPV Analisis RLA (mm/s)	PPV Analisis SHA (mm/s)	PPV Actual (mm/s)	Deviasi RLA (mm/s)	Deviasi RLA (%)	Deviasi SHA (mm/s)	Deviasi SHA (%)
642	50	1,06	1,12	1,110	-0,05	-4%	0,009	1%
597	50	1,12	1,25	1,230	-0,11	-9%	0,018	1%
704	50	0,99	0,97	0,950	0,04	4%	0,024	3%
620	50	1,09	1,18	1,115	-0,03	-2%	0,064	6%
665	50	1,04	1,06	1,070	-0,03	-3%	-0,009	-1%
580	50	1,14	1,30	1,390	-0,25	-18%	-0,087	-6%
676	50	1,02	1,04	1,050	-0,03	-2%	-0,014	-1%
705	50	0,99	0,97	0,950	0,04	4%	0,022	2%
638	50	1,07	1,13	1,150	-0,08	-7%	-0,021	-2%
632	50	1,08	1,15	1,160	-0,08	-7%	-0,014	-1%
502	50	1,23	1,62	1,640	-0,41	-25%	-0,022	-1%
607	50	1,10	1,22	1,190	-0,09	-7%	0,027	2%
625	50	1,08	1,16	1,190	-0,11	-9%	-0,025	-2%
644	50	1,06	1,11	1,140	-0,08	-7%	-0,026	-2%
579	50	1,14	1,31	1,350	-0,21	-16%	-0,044	-3%
568	50	1,15	1,34	1,420	-0,27	-19%	-0,075	-5%
731	50	0,97	0,93	0,920	0,05	5%	0,015	2%
561	50	1,17	1,41	1,480	-0,31	-21%	-0,069	-5%
603	50	1,13	1,28	1,300	-0,17	-13%	-0,016	-1%
530	50	1,22	1,58	1,610	-0,39	-24%	-0,030	-2%
568	50	1,18	1,44	1,470	-0,29	-20%	-0,026	-2%
630	50	1,12	1,25	1,270	-0,15	-12%	-0,017	-1%
678	50	1,07	1,14	1,160	-0,09	-8%	-0,023	-2%
728	50	1,02	1,04	1,050	-0,03	-2%	-0,014	-1%
615	50	1,15	1,35	1,390	-0,24	-17%	-0,039	-3%
672	50	1,10	1,20	1,210	-0,11	-9%	-0,012	-1%
734	50	1,04	1,06	1,050	-0,01	-1%	0,012	1%
964	50	0,80	0,71	0,680	0,12	18%	0,035	5%
626	50	1,16	1,38	1,410	-0,25	-18%	-0,028	-2%
641	50	1,15	1,35	1,420	-0,27	-19%	-0,070	-5%
585	50	1,21	1,57	1,630	-0,42	-26%	-0,064	-4%
664	50	1,14	1,31	1,430	-0,29	-20%	-0,120	-8%
584	50	1,22	1,61	1,720	-0,50	-29%	-0,114	-7%

* RLA = Regresi Linear

** SHA = Signature Hole



**Lampiran 9 Hasil pengukuran getaran peledakan dengan metode yang baru
pada jarak 500 – 150 meter**

Jarak (m)	Isian (kg)	PPV Analisis (mm/s)	PPV Actual (mm/s)	Deviasi (mm/s)	Persentase deviasi (%)
500	60	1,87	1,93	-0,06	-3%
500	60	1,87	1,84	0,03	2%
500	60	1,87	1,94	-0,07	-4%
450	60	2,19	2,23	-0,04	-2%
450	60	2,19	2,09	0,1	5%
450	60	2,19	2,32	-0,13	-6%
400	60	2,61	2,54	0,07	3%
400	60	2,61	2,66	-0,05	-2%
400	60	2,61	2,72	-0,11	-4%
350	35	2,13	2,23	-0,1	-4%
350	35	2,13	2,01	0,12	6%
350	35	2,13	2,24	-0,11	-5%
300	35	2,68	2,75	-0,07	-3%
300	35	2,68	2,84	-0,16	-6%
300	35	2,68	2,82	-0,14	-5%
250	15	1,87	1,97	-0,1	-5%
250	15	1,87	1,94	-0,07	-4%
200	15	2,61	2,65	-0,04	-2%
200	15	2,61	2,75	-0,14	-5%
150	10	2,96	2,76	0,2	7%
150	10	2,96	2,79	0,17	6%



Lampiran 10 Waktu gali unit

Jam Sampling	09,00 Wita
Layer	2
Digger	Liebherr 9200 (Ex 6033)
Average Digging Time	10,16

No,	Hauler	Digging Time (Second)	No,	Hauler	Digging Time (Second)
1	A	11,95	16	E	10,10
2		8,51	17		11,97
3		10,02	18		8,77
4		11,70	19		8,73
5	B	11,19	20	F	10,60
6		9,58	21		10,30
7		10,86	22		8,31
8		11,68	23		9,23
9	C	9,86	24	G	10,67
10		10,03	25		8,86
11		10,93	26		11,49
12		8,77	27		10,71
13	D	8,96	28	H	9,22
14		11,29	29		11,92
15		8,84	30		9,60

Layer	1
Digger	Liebherr 9150 (Ex 6031)
Average Digging Time	8,32

No,	Hauler	Digging Time (Second)	No,	Hauler	Digging Time (Second)
1	A	11,45	16	D	8,43
2		7,75	17		7,47
3		7,41	18		7,85
4		8,52	19		7,42
5		8,56	20		8,70
6	B	8,96	21	E	8,50
7		7,82	22		8,62
8		8,61	23		8,23
9		8,11	24		7,44
10		8,50	25		8,48
11	C	8,97	26	F	8,18
12		8,09	27		8,38
13		8,36	28		7,97
14		7,66	29		8,53
		8,92	30		7,78



Jam Sampling	10,45 Wita
Layer	2
Digger	Liebherr 9200 (Ex 6033)
Average Digging Time	9,77

No,	Hauler	Digging Time (Second)	No,	Hauler	Digging Time (Second)
1	A	8,65	16	E	9,73
2		9,96	17		9,22
3		8,74	18		10,44
4		8,70	19		11,76
5	B	9,27	20	F	9,16
6		10,76	21		11,74
7		9,53	22		9,66
8		8,96	23		8,65
9	C	8,86	24	G	10,80
10		9,47	25		9,12
11		9,37	26		9,18
12		10,88	27		9,65
13	D	11,33	28	H	10,22
14		10,35	29		10,87
15		9,38	30		8,65

Jam Sampling	15,20 Wita
Layer	1
Digger	Liebherr 9200 (Ex 6033)
Average Digging Time	9,96

No,	Hauler	Digging Time (Second)	No,	Hauler	Digging Time (Second)
1	A	8,54	16	E	8,41
2		10,27	17		11,67
3		9,33	18		8,51
4		11,12	19		9,01
5	B	9,99	20	F	10,80
6		11,60	21		9,58
7		10,48	22		10,50
8		10,62	23		9,77
9	C	8,96	24	G	10,35
10		11,73	25		9,55
11		10,56	26		9,37
12		11,36	27		8,46
13	D	10,57	28	H	9,96
14		10,53	29		9,00
15		9,48	30		8,64



Lampiran 11 Perlengkapan peledakan non elektrik



Properties

Delay Time (msec)	Connector Block Colour
9	Purple
17	Yellow
25	Red
42	White
67	Blue
109	Black
176	Orange

Hazardous Shipping Description

Detonator assemblies, Non-electric, 1.1B , UN0 360



Surface delay Non-Elektrik



Properties

Period / Delay Time (msec)	J-Hook Colour	Period / Delay Time (msec)	J-Hook Colour
0 / 25	White	10 / 3500	Purple
1 / 500	Red	11 / 3900	Light Blue
2 / 800	Blue	12 / 4400	Dark Green
3 / 1100	Brown	13 / 4900	Mauve
4 / 1400	Orange	14 / 5400	Mustard
5 / 1700	Aqua	15 / 5900	Crimson
6 / 2000	Gold	16 / 6500	Yellow
7 / 2300	Lime Green	17 / 7200	Dark Blue
8 / 2600	Pink	18 / 8000	Green
9 / 2900	Black		



In-Hole delay Non-Elektrik



Properties

Colour	Yellow
Tube	Standard
Tube diameter (mm)	3 (external)
Velocity of Detonation (m/s)	2100 +/- 300

Hazardous Shipping Description

Articles, Explosives, NOS, 1.4S, UN 0349



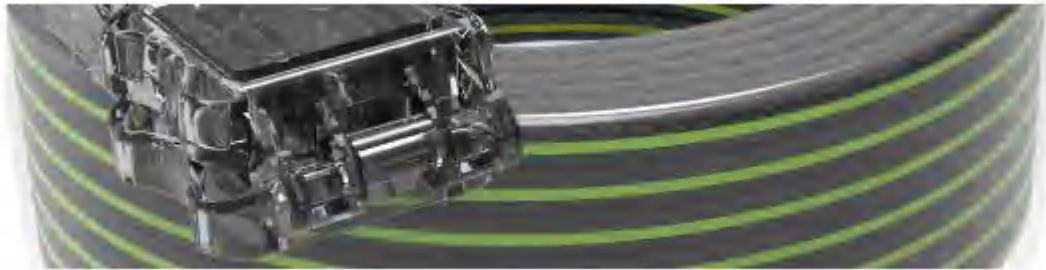
Lead Line Non-Elektrik

Sumber : www.DynaNobel.com



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Lampiran 12 Perlengkapan peledakan elektronik



Properties	
Detonator Shell	Copper
Cable Colour	Black with green stripe
Detonator Operating Temperature (range)	-40°C to +80°C
Detonator Strength	#12
Net Explosive Quantity (per 100 units)	0.1kg
Tensile Strength (N)	410 (standard) 460 (XTM)
Maximum Delay	20,000ms
Maximum Detonators per Blaster	16,000 (synchronised 10 x Bench Commanders)
Maximum Surface Wire Length	2.5km
Hazardous Shipping Description Detonators, Electric, for Blasting 1.4B, UN 0255	



Elektronik Detonator 4G

