

Deep Yellow Limited

ABN 97 006 391 948

76 Hilary Street , Mount Isa Qld 4825

PO Box 2400 Mount Isa 4825

Tel : 07 4743 0734

Fax : 07 4743 3596

Website: www.deeptyellow.com.au

RADIATION REPORT

NORTHERN TERRITORY PROJECTS

MARCH 2013

To: Martin Kavanagh,

CC: Dennis Bishop

From: Geoffrey Gee

Date: 5-4-2013

1.0 SUMMARY

In April 2011 Deep Yellow Limited (DYL) initiated an Environmental Radiation Monitoring Program for the Napperby Project and the Alice Springs Depot located in the Northern Territory. This will be a baseline to determine a radiological background and enable DYL to identify any increases in radiation due to work practises. This 2013 survey is the first follow up of the initial 2011 survey.

All readings were taken with an RS-125 Super Spec which has been calibrated for the purpose of dose rate and environmental monitoring. The same instrument was used in both the 2011 and 2013 surveys. The thirty second assay function was used and readings were recorded in micro Siverts/hr ($\mu\text{Sv/hr}$). Please refer to appendix one to convert $\mu\text{Sv/hr}$ to counts per second. Each reading was taken at one meter above the ground and a corresponding GPS location was recorded.

2.0 Alice Springs Depot

Six locations were selected at the Alice Spring Depot, 31 George Crescent Alice Springs. These locations and corresponding readings are outlined in the table below.

Date	Office Entrance	Yard Entrance	Red Container Entrance	Shed Entrance	Bathroom Entrance	White Container internal
	$\mu\text{Sv/hr}$	$\mu\text{Sv/hr}$	$\mu\text{Sv/hr}$	$\mu\text{Sv/hr}$	$\mu\text{Sv/hr}$	$\mu\text{Sv/hr}$
25/03/2011	0.047	0.066	0.048	0.058	0.055	-----
27/02/2013	0.042	0.074	0.060	0.068	0.053	0.118

Readings around the Alice Springs Depot are considered to be at normal background levels. The Highest reading was recoded inside the white sea-container, adjacent to a wheely-bin containing standards. This would result in an annual occupational dose (2000hrs) of 0.236 milli Sieverts (mSv). A non occupational annual dose of 1.033 mSv would be received if a person was to spend an entire year at this location. (Note: this locked container is not accessible to the public)

3.0 Napperby Project Environmental Monitoring.

Two active areas are present; being the fenced compound and the rehabilitated costean beside the main access track.

A grid pattern technique was used for Environmental radiation monitoring at the Napperby Project. Areas monitored included an 80m x 80m fenced compound built by Toro Energy and a borrow pit/water

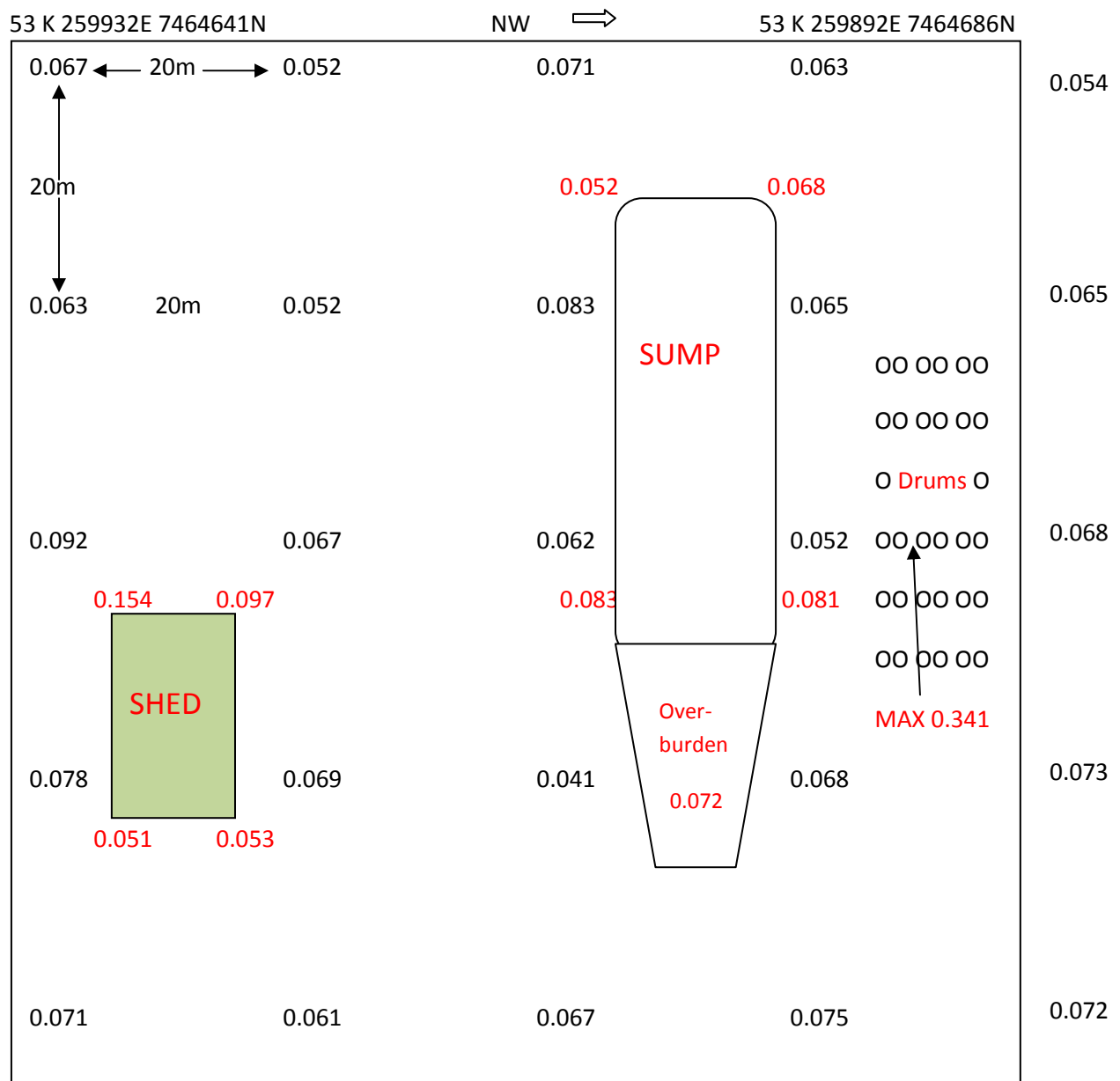
costean “rehabilitated” by Toro Energy. Another disposal pit used by Toro just outside the fenced compound was checked and found to be at background levels, and hence not included for ongoing monitoring.

Figures below show the actual reading and the tables which follow detail the location of each reading.

Environmental Radiation Monitoring Readings; Napperby Compound April 2011

20m X 20m Grid over 80m X 80m Compound. Radiation monitoring readings taken around shed, disposal pit and drums are highlighted in red.

All reading recorded in micro Sieverts per hour $\mu\text{Sv/hr}$ on RS125 Super Spectrometer SN:2378



53 K 260002E 7464668N

53 K 259954E 7464722N

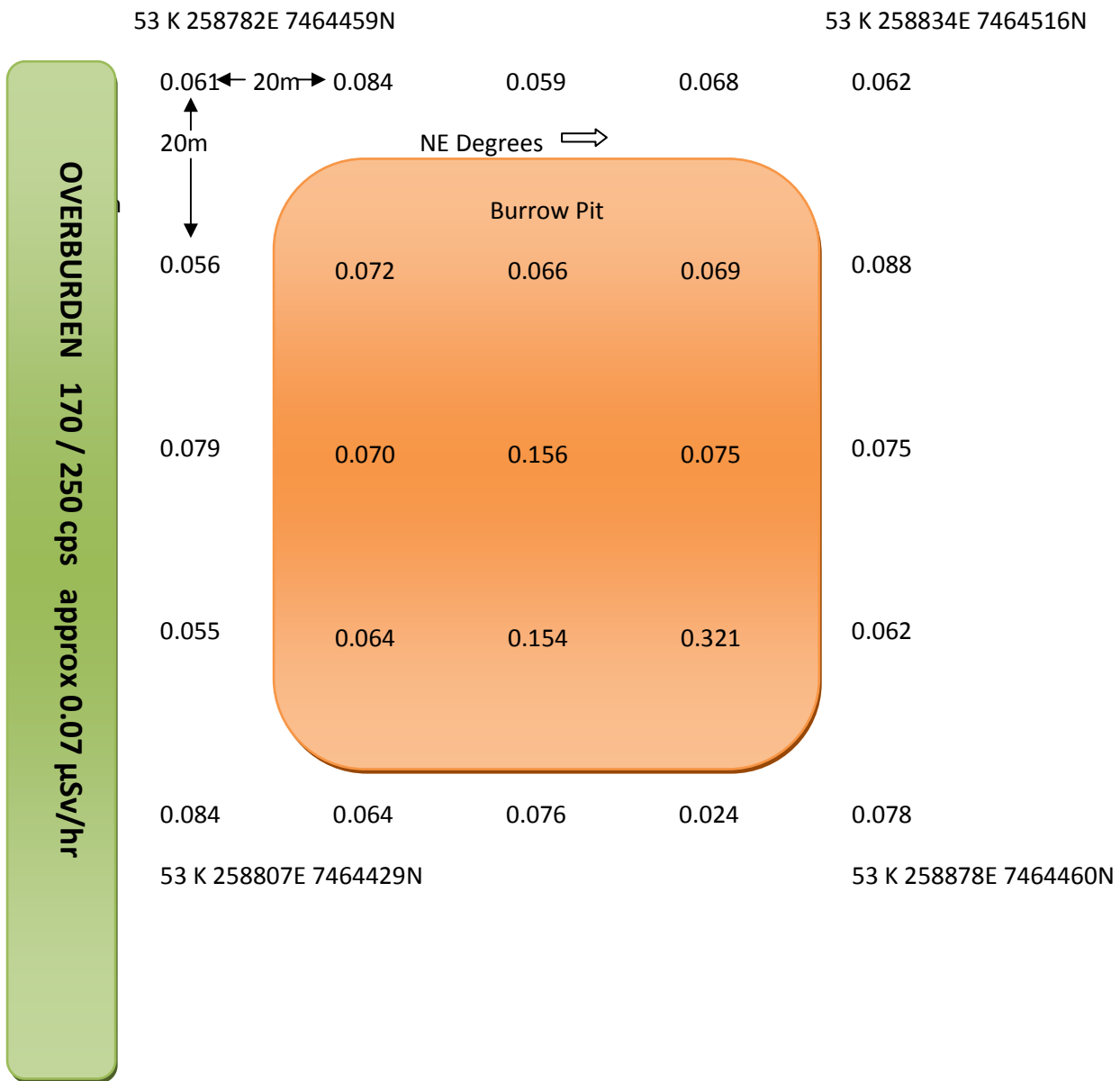
Napperby Compound Environmental Radiation Monitoring Readings

			Mar-11	Mar-13
Location	Waypoint	GPS Co-ordinates	μSv/hr	
Compound 20x20m Grid	102	53 K 260002 7464668	0.071	0.064
Compound 20x20m Grid	103	53 K 259989 7464659	0.078	0.063
Compound 20x20m Grid	104	53 K 259973 7464650	0.092	0.072
Compound 20x20m Grid	105	53 K 259958 7464639	0.063	0.075
Compound 20x20m Grid	106	53 K 259932 7464641	0.067	0.049
Compound 20x20m Grid	107	53 K 259932 7464642	0.052	0.058
Compound 20x20m Grid	108	53 K 259945 7464653	0.052	0.062
Compound 20x20m Grid	109	53 K 259959 7464665	0.067	0.055
Compound 20x20m Grid	110	53 K 259974 7464676	0.069	0.056
Compound 20x20m Grid	111	53 K 259986 7464681	0.061	0.082
Compound 20x20m Grid	112	53 K 259973 7464698	0.067	0.058
Compound 20x20m Grid	113	53 K 259961 7464687	0.041	0.061
Compound 20x20m Grid	114	53 K 259948 7464677	0.062	0.067
Compound 20x20m Grid	115	53 K 259931 7464666	0.083	0.076
Compound 20x20m Grid	116	53 K 259916 7464654	0.071	0.053
Compound 20x20m Grid	117	53 K 259907 7464666	0.063	0.069
Compound 20x20m Grid	118	53 K 259920 7464678	0.065	0.083
Compound 20x20m Grid	119	53 K 259933 7464689	0.052	0.066
Compound 20x20m Grid	120	53 K 259949 7464699	0.068	0.064
Compound 20x20m Grid	121	53 K 259967 7464710	0.075	0.063
Compound 20x20m Grid	122	53 K 259954 7464722	0.072	0.071
Compound 20x20m Grid	123	53 K 259940 7464715	0.073	0.062
Compound 20x20m Grid	124	53 K 259927 7464707	0.068	0.075
Compound 20x20m Grid	125	53 K 259913 7464701	0.065	0.081
Compound 20x20m Grid	126	53 K 259892 7464686	0.054	0.073
Location	Waypoint	GPS Co-ordinates	μSv/hr	
Sump	128	53 K 259910 7464684	0.068	0.056
Sump	129	53 K 259928 7464698	0.081	0.056
Sump (Top of spoil dump)	130	53 K 259938 7464701	0.072	0.067
Sump	131	53 K 259931 7464692	0.083	0.061
Sump	132	53 K 259915 7464683	0.052	0.069
Location	Waypoint	GPS Co-ordinates	μSv/hr	
Shed	98	53 K 259980 7464668	0.051	0.054
Shed	99	53 K 259972 7464658	0.145	0.142
Shed	100	53 K 259971 7464658	0.097	0.12
Shed	101	53 K 259973 7464666	0.053	0.065

Environmental Radiation Monitoring Reading; Napperby Borrow Pit April 2011

20m X 20m Grid over 35m x 35m Borrow Pit

All reading recorded in micro Sieverts per hour $\mu\text{Sv/hr}$ on RS125 Super Spectrometer SN:2378



Comparison of Environmental Monitoring Readings Napperby Rehabilitated Borrow Pit /Water Costean Area.

Location	Waypoint	GPS Co-ordinates	$\mu\text{Sv/hr}$	
			Mar-11	Mar-13
Borrow Pit 20x20m Grid	145	53 K 258878 7464460	0.078	0.083
Borrow Pit 20x20m Grid	146	53 K 258867 7464476	0.062	0.57
Borrow Pit 20x20m Grid	147	53 K 258856 7464491	0.075	0.064
Borrow Pit 20x20m Grid	148	53 K 258844 7464505	0.086	0.061
Borrow Pit 20x20m Grid	149	53 K 258834 7464516	0.062	0.066
Borrow Pit 20x20m Grid	150	53 K 258820 7464506	0.068	0.078
Borrow Pit 20x20m Grid	151	53 K 258831 7464482	0.069	0.09
Borrow Pit 20x20m Grid	152	53 K 258837 7464477	0.075	0.06
Borrow Pit 20x20m Grid	153	53 K 258845 7464465	0.321	0.557
Borrow Pit 20x20m Grid	154	53 K 258846 7464435	0.24	0.086
Borrow Pit 20x20m Grid	155	53 K 258851 7464439	0.076	0.096
Borrow Pit 20x20m Grid	156	53 K 258833 7464451	0.121	0.167
Borrow Pit 20x20m Grid	157	53 K 258826 7464465	0.159	0.171
Borrow Pit 20x20m Grid	158	53 K 25817 7464471	0.066	0.115
Borrow Pit 20x20m Grid	159	53 K 258808 7464487	0.059	0.083
Borrow Pit 20x20m Grid	160	53 K 258810 7464455	0.084	0.054
Borrow Pit 20x20m Grid	161	53 K 258803 7464463	0.072	0.07
Borrow Pit 20x20m Grid	162	53 K 258810 7464450	0.073	0.09
Borrow Pit 20x20m Grid	163	53 K 2258882 7464415	0.084	0.09
Borrow Pit 20x20m Grid	164	53 K 258811 7464426	0.055	0.071
Borrow Pit 20x20m Grid	165	53 K 258801 7464441	0.079	0.067
Borrow Pit 20x20m Grid	166	53 K 258793 7464450	0.056	0.061
Borrow Pit 20x20m Grid	167	53 K 258782 7464459	0.061	0.08
Borrow Pit 20x20m Grid	168	53 K 258835 7464423	-	0.086
Borrow Pit Hot Spot	near 152	53 K 258844 7464467	-	0.686

(Note: public exposure limit is 0.11 micro Sv/hr)

4. Observations

Readings at the shed inside the compound were higher than background. This is to be expected as it is the location where sample pulps and coarse rejects are stored. Pallets of samples were secured by tarps and ropes. The shed inside the compound is adequately signed.

Samples are also stored in 44 Gallon steel drums inside the compound. Drum lids are secure and all of the drums are in good order. Radioactivity was measured around the drums and a maximum reading of $0.525\mu\text{Sv/hr}$ was recorded (c.f. 0.341 max 2011) This is a relatively low dose rate and would result in an annual occupational dose of 1.050 mSv. However, signage and barricading was put in place to alert staff of radioactive samples. A maximum reading of 0.132 micro Sv was measured just inside the fenceline adjacent to the drums, and a maximum of 0.08 microSv just outside the fence. Annual public exposure would thus be $(0.08 \times 24 \times 365)$ microSv or 0.70 milliSv; hence within annual exposure limits.

Readings at the Napperby rehabilitated water storage pit; located on a NT Main Roads borrow pit, were variable. This is the site of Toro's attempt to clean up the carnotite exposed by an old Main Roads water storage costean. Unfortunately the dozing has exposed some probable insitu carnotite whilst filling in the offending costean. Spotty visible carnotite is still present at surface. The **highest reading of $0.68\mu\text{Sv/hr}$** is still low and would result in an occupational dose (1.e. 2000 hours) of 1.36 mSv well below the 5mSv annual dose limit set by DYL policy for Employees and contractors. However this level of radiation would result in an annual public dose of 5.95mSv. Remediation to normal background level might be achievable by hand-picking all visible carnotite and re-burying.

4.0 Conclusion

The alpha particle monitoring equipment owned by DYL was not available at the time of monitoring. It is recommended that twice a year this equipment be used for a large area Alpha particle surface contamination survey over the Alice Springs Depot. Monitoring with the RS125 at the locations outlined in this report should be carried out on a weekly basis when employees are working out of the Alice Springs Depot.

The compound at Napperby is securely fenced and a safe well signed storage facility. As this is a designated work area it is suggested Environmental Monitoring at the compound is conducted twice a year using the same process and grid patterns outlined in this report.

No further monitoring is required at the backfilled disposal pit located outside of the compound used by Toro. It was noted that reading at this location were at background level and no radiological increase has occurred through the disposal of samples.

As the level of radiation at the rehabilitated borrow pit/water storage dam used by NT Main Roads Dept may result in an annual public dose over the 1mSv limit it is recommended that the remaining spotty carnotite chips be hand picked and reburied. This process will reduce the radiation at this location level to an acceptable level. Another grid survey will be conducted to ensure this.

Photograph of the rehabilitated water storage costean site:



Appendix One; Counts per second (CPS) to microSieverts per hour ($\mu\text{Sv/hr}$) conversion table.

2500cps	0.875
1000cps	0.35
200cps	0.07
100cps	0.035

