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EL 4209 TOP SPRING, N.T.

ANNUAL REPORT
YEAR ENDING 30 JUNE, 1986

Submitted by : I. C. Colliver .....

Accepted by : W. H. Johnston .....

Date : July, 1986

Copies to : * N.T. Department of Mines and Energy
CRAE Library, Darwin
CRAE Library, Canberra

Map Reference

SE 53-7 Walhallow

Report number

130655

CONTENTS

1.0 SUMMARY

Field season 1985 drainage gravel sampling was concentrated in the contiguous catchment areas of upper Top Spring Creek and the Donkey Hole Yard tributary system of Archies Creek, following up previously reported positive results.
Sampling resulted in detection of:
one chromite grain in a check sample from a site near Donkey Hole Yard;
one microdiamond in a follow-up sample from a site on a "Donkey Hole Creek" headwaters tributary; and
one microdiamond in a sample from a Gum Creek tributary on the north-central boundary of the reduced EL area.

A reconnaissance geological mapping traverse was made of the Top Spring Creek section upstream from the site of drainage samples with one chrome diopside grain, two diamonds and two microdiamonds previously reported.
This reconnaissance resulted in identification of outcrops in the creek bed and banks of an indurated conglomeratic "palaeogravel", seen in places to overlie a dense cherty-duricrusted surface developed on (Cambrian) Top Spring Limestone and to be overlain by (Cretaceous?) kaolinitic sandstone.
Two microdiamonds were reported in an outcrop grab sample.

A program of Gemcodrill auger traversing was undertaken in the Bauhinia Yard Prospect area in November 1985, aimed at testing the extent and pattern of palaeogravel occurrence beneath black soil cover away from the outcrop area.
The auger program was terminated without achieving definitive results.

In field season 1986, samples bulking >1tonne were taken of the Bauhinia Yard Prospect conglomeratic palaeogravel and of a boulder conglomerate located in a headwaters valley of the Donkey Hole Yard tributary system of Archies Creek (Donkey Hole Creek Prospect).
Samples were beneficiated to produce matrix-enhanced material for processing for kimberlitic indicator minerals and microdiamonds.
Results are awaited.

2.0 ASSESSMENT

The indurated conglomeratic "palaeogravel" of the Bauhinia Yard Prospect area is considered a very likely source of diamonds and microdiamonds reported in drainage samples from Top Spring Creek.

The palaeogravel overlies a duricrusted surface developed on (Cambrian) Top Spring Limestone and underlies, or constitutes a basal facies of, kaolinitic sandstone of probable Cretaceous age.

It has yet to be established whether the conglomeratic gravel represents a discrete palaeodrainage channel facies or a non-vectored palaeoregolith.
The former alternative is considered to offer some prospect of the gravel unit either constituting an alluvial diamond resource in its own right, or vectoring a primary diamond source.

Similarly, outcrops of a boulder conglomerate, of obscure correlation, may be the source of microdiamonds reported in drainage samples from the Donkey Hole Creek Prospect area.

3.0 INTRODUCTION

Top Spring EL application 4209 was lodged on 18 February 1983 for an area of 355 blocks (about 1160 square km) and was granted on 1 July 1983 (Plan NTd 2061). The area was taken up for exploration for diamondiferous kimberlites.

The work program completed in the first year of tenure was reported in CRAE Report 130432 (Colliver, 1984).
In summary:

Reconnaissance and follow-up drainage gravel sampling for kimberlitic indicator mineral observation resulted in detection of:
single chromite grains in two samples;
one diamond and one chrome diopside grain in separate samples from upper Top Spring Creek; and
single microdiamonds (<0.4mm) in three samples from other creeks rising in the Top Spring Creek headwaters area.

Prospect scale ground magnetic surveys and geological mapping, followed by scout drilling, were carried out over a photofeature with a microdiamond reported in a loam sample.
Drilling showed the feature to be underlain by Top Spring Limestone continuous with that beneath the surrounding black soil plain.

A detailed, low level airborne magnetic and radiometric survey was flown over the EL area.

The work program completed in the second year of tenure was reported in CRAE Report 130523 (Colliver, 1985).
In summary:

Drainage gravel sampling was concentrated in the contiguous catchment areas of upper Top Spring Creek and the Donkey Hole Yard tributary system of Archies Creek, following up positive results of previous sampling.
Two chromite grains were reported in a sample from an Archies Creek tributary site with dolerite/basalt locally prominent in outcrop and drainage float.
Two diamonds and two microdiamonds (<0.4mm) were reported in a resample of the site, on upper Top Spring Creek, of a previously reported chrome diopside grain.
Some results were outstanding at year two report date.

From data review of the tenure year one airborne survey, two aeromagnetic anomalies were selected for follow-up as possible diatreme responses.
Ground magnetic surveys were conducted over these anomalies, designated TSP 1, TSP 2, and concurrently over seven photofeatures, designated TSP 3 ... TSP 9, in the Top Spring Creek headwaters catchment area.
Two microdiamonds were reported in a loam sample from feature TSP 7.
One chromite grain was reported in a sample of chert breccia from feature TSP 9.

Scout drilling showed features TSP 2, TSP 5, TSP 7 and TSP 9 to be unrelated to kimberlitic diatremes.

Statutory reduction of tenement area at the end of tenure year two resulted in retention of an area of 168 blocks (about 550 square km) into tenure year three (plan NTd 3980).

Outstanding results of tenure year two sampling and work carried out during the third year of tenure are discussed in this report.

4.0 DRAINAGE GRAVEL SAMPLING

Drainage gravel sampling programs in field seasons 1984 and 1985 were concentrated in the catchment areas of Top Spring Creek and the Donkey Hole Yard tributary system of Archies Creek; in which areas positive results were reported from previous samplings.
Sampling programs were helicopter supported, for selection of best available heavy mineral accumulation (trap) sites.
All samples were processed by the CRAE Belmont laboratory for kimberlitic indicator mineral observation and detection of microdiamonds (<0.4mm).

Sample locations are shown on plan NTd 4185.
Sampling data and results are tabulated in Appendix 1 and discussed below.

4.1 Field season 1984 infill and follow-up sampling

Ten drainage samples (nos. 1082046-055) were collected from four sites on Top Spring Creek headwaters tributaries, following up previous reports of a diamond in sample 965623 and a chrome diopside grain in sample 1080075.

[Two diamonds and two microdiamonds were reported (Colliver, 1985) in samples 1082053, 1082054 and 1082055, from recovered sample site 1080075.]

Kimberlitic indicator and microdiamond reports were negative for all other samples of this series.

Ten drainage samples (nos. 1082202-209, 1082215, 1082216) were collected to infill sampling coverage of the Top Spring Creek and Archies Creek drainage systems.

[Two chromite grains were reported (Colliver, 1985) in sample 1082215, from an Archies Creek tributary site with dolerite/basalt locally prominent in outcrop and drainage float.]

Kimberlitic indicator and microdiamond reports were negative for all other samples of this series.

4.2 Field season 1985 infill and follow-up sampling

Thirteen drainage samples (10841- and 10843-series numbers) were collected to infill sampling coverage of the northern sector of the reduced EL area (plan NTd 3980).

One microdiamond was reported in sample 1084152, from a Gum Creek tributary on the north-central boundary of the reduced EL area.
Kimberlitic indicator and microdiamond reports were negative for all other samples of these series.

Thirteen follow-up drainage samples (10817- and 970-series numbers) were collected in the headwaters catchment areas of Top Spring Creek and the Donkey Hole Yard tributary system of Archies Creek.

One chromite grain was reported in check sample 1081713, from a site near Donkey Hole Yard and about 300m downstream from 1984 drainage sample site 1082215 (two chromites previously reported).

One microdiamond was reported in sample 1081720, from a site on a "Donkey Hole Creek" headwaters tributary about 300m upstream from 1983 drainage sample site 1080154 (one microdiamond previously reported). Sample 1081715, taken on a different tributary about 700m upstream from 1983 site 1080154, gave negative results; as did sample 1081716, from an adjacent tributary.
Check sample 1081714, at the site of 1983 drainage sample 1080183 (one microdiamond previously reported) gave negative results.

Negative results were reported for sample 1081738, from a site on upper Mallapunyah Creek (which has its headwaters catchment contiguous to the northeast with that of "Donkey Hole Creek").

Negative results were reported for infill/follow-up samples 1081739-742, from Letterbox Creek, which has a catchment contiguous to the west with that of upper Top Spring Creek. Sites included a resample of 1983 drainage sample site 1080282 (one microdiamond previously reported).

Negative results were reported for follow-up samples 970857-859, from the Bauhinia Bore Paddock area of upper Top Spring Creek.

5.0 BAUHINIA YARD PROSPECT INVESTIGATION

Following up reports of a chrome diopside grain, two diamonds and two microdiamonds from a single drainage sample site on upper Top Spring Creek (Colliver, 1985), a reconnaissance geological mapping traverse was made of the creek section upstream across the Bauhinia Bore Paddock (Plan NTd 4186).
This traverse resulted in identification of outcrops in the creek bed and banks of an indurated conglomeratic "palaeogravel".

5.1 Outcrop geology

Palaeogravel outcrops in the creek bank are perched, in places well above the level of the black soil plain extending east of the creek, on the flank of a subcrop-rubbly strike ridge of well-indurated sandstone and siliceous dolostone.
The sandstone outcrops are of thin bedded to laminated grey silty fine grained quartz sandstone, duricrusted to a billy-like bouldery surface. This (Roper Group?) unit dips shallowly west and is juxtaposed to the east, by faulting or unconformity, against steeply east-dipping (McArthur Group?) cherty-laminated siliceous dolostones.

Palaeogravel outcrops in the creek bed can be seen in places to overlie a dense cherty-duricrusted surface developed on characteristically sculptured-weathering Top Spring Limestone.

The palaeogravel has abundant very well rounded pebbles (few cobbles) of chert/chalcedony in a matrix of chert- and quartz-gritty, indurated kaolinitic quartzwacke. Pebbles are generally matrix supported, with locally systematic variations of abundance and sorting suggestive of a flat-lying stratification.

South of the best exposed creek bed outcrops of pebble conglomerate, outcrops were located of weakly indurated or friable-weathering, poorly stratified, flat-lying (Cretaceous?) kaolinitic gritty sandstone to sandy claystone.
At two localities, friable kaolinitic sandstone overlies apparently in situ pebbly gravel. It is uncertain from these exposures whether the systematic relationship is one of stratigraphic succession or conformity, or of lateral facies variation.

5.2 Outcrop sampling

In field season 1985, outcrop grab samples were collected to test the Bauhinia Yard palaeogravel as a possible source of diamonds and microdiamonds reported from drainage gravel samplins downstream in Top Spring Creek.

Samples 1081717-718 (aggregating >200kg) were taken of conglomeratic material and sample 1081719 of yellow kaolinitic gritty sandstone.
Two microdiamonds were reported in sample 1081718.

In field season 1986, a conglomerate sample bulking >1tonne was collected.

This sample was processed through a jaw crusher set at 6mm and screened to separate +10mm, +3.3mm and -3.3mm fractions. +10mm and +3.3mm fractions were separately processed through a lightly-loaded crushing rolls set at 2mm and rescreened. Good separation of clast and matrix material was effected and a >1/2tonne sample of the -3mm product (estimated >70% matrix material) was forwarded to the CRAE Belmont laboratory for processing for detection of kimberlitic indicator minerals and microdiamonds.
Results are awaited.

5.3 Gemcodrill auger traversing

A program of Gemcodrill auger traversing was undertaken in November 1985, aimed at testing the extent of palaeogravel occurrence beneath black soil cover away from the sandstone ridge outcrop area. It was also hoped to establish, from the pattern of occurrence, whether the gravel represented a discrete palaeodrainage channel facies or a non-vectored palaeoregolith.
The former alternative was considered to offer some prospect of the gravel unit either constituting an alluvial diamond resource in its own right, or vectoring a primary diamond source.

A total 23 holes were drilled on two lines, to depths of 1.7m to 5m.
Gemcodrill auger logs are included in Appendix 2.
Collar locations are shown on Plan NTd 4186.

The first six holes were drilled at 100m spacings on a line bearing magnetic north from a "local grid" origin 10000mE 10000mN, established close to the sampled palaeo-gravel outcrop in the bed of Top Spring Creek, at about AMG Zone 53 578900E 8113700N.
Holes at 10100mN and 10200mN bottomed in yellow clayey sandstone. Chips and well rounded pebbles of chert were recovered, but it could not be established with confidence that the palaeogravel unit had been penetrated.
Holes at 10300mN and 10500mN bottomed in Top Spring Limestone, without making an intersection of the palaeo-gravel.

17 holes were drilled at 100m centres on "traverse 1" (nominally line 10900mN) along the northeastern fence of the Bauhinia Bore Paddock, across a black soil plain area.

From "traverse 1" holes, the black soil was found to have a thickness of about 2m and to overlie yellow clayey sandstone, which was not penetrated by the auger. This sandstone is correlated with (Cretaceous?) white kaolinitic sandstone mapped in outcrop in Top Spring Creek, south of the grid origin.

The auger program was terminated without achieving definitive results.

6.0 DONKEY HOLE CREEK PROSPECT INVESTIGATION

[In field season 1984, two outcrops were sampled for investigation as possible diamond hostrock lithotypes, in a valley floored by Wollogorang Fm. (B.M.R., 1984) dolomitic sediments and drained by the Archies Creek headwaters tributaries from which microdiamonds were previously reported in drainage samples 1080154 and 1080183.

Rock sample 1082409 was taken of a polymict boulder conglomerate, of no obvious stratigraphic correlation, standing as a striking outcrop pinnacle on the valley floor. Sample material was selectively cobbed to enhance representation of quartzwacke matrix material.
No kimberlitic indicator minerals or microdiamonds were detected in a total 102kg of material processed by the CRAE Belmont laboratory.

Rock sample 1081305 was taken from a nearby outcrop of very weathered fragmental volcanic rock, probably representing an inlier of the Settlement Creek Volcanics -correlative volcanic pile which occupies the core of a domal structure covering much of the Archies Creek drainage area.
No kimberlitic indicator minerals or microdiamonds were detected in a 7.7kg sample.]

In field season 1986, ground reconnaissance resulted in location of additional outcrops of the boulder conglomerate on the southeastern flank of a strike ridge of Masterton Sandstone (B.M.R., 1984), about 0.5km north of the previously sampled pinnacle outcrop.

Outcrops are of an unsorted, polymict, clast-supported conglomerate with an interstitial matrix of indurated gritty quartzwacke. Clasts, up to boulder size, are well rounded and most commonly of ferruginous quartz sandstone. Chert, slaty siltstone, vein quartz and massive hematite cobbles and pebbles are also present. Clasts and matrix alike are pervasively stained maroon-grey, presumably by fine hematite. In places, a flat-lying stratification can be discerned.
Contact relationship with the Masterton Sandstone is obscured by scree of both sandstone and conglomerate.

A conglomerate sample bulking >1tonne was collected from outcrop at this locality.

The sample was processed through a jaw crusher set at 6mm and screened to separate +10mm, +3.3mm and -3.3mm fractions. Separation of clast and matrix material was not particularly effective.
The +10mm fraction was recycled through the jaw crusher and +3.3mm fractions from both crushings were then processed through a crushing rolls set at 2mm.
The crushing rolls product was screened to give a >1/2tonne sample of -3mm (estimated >50% matrix material) which was forwarded to the CRAE Belmont laboratory for processing for detection of kimberlitic indicator minerals and micro-diamonds.
Results are awaited.

7.0 REFERENCES

B.M.R. 1984: Geology of the Abner Range Region (1:100 000 geological map)

Colliver,I.C. 1984: Top Spring EL 4209 Annual Report Year Ending 30 June 1984 CRAE Report 130432

Colliver,I.C. 1985: Top Spring EL 4209 Annual Report Year Ending 30 June 1985 CRAE Report 130523

Plumb,K.A. & Rhodes,J.M. 1964: Wallhallow, N.T. BMR 1:250 000 Geological Series Explanatory Notes

8.0 KEYWORDS

Diamonds, conglomerate, diamond indicators, samplins-drainage, samplins-rock, drill-auser

9.0 LOCATION

SE 53-7 Wallhallow (6063 Kilsour)

10.0 LIST OF PLANS

Plan No	Title	Scale
NTd 3980	Location plan - reduced area Top Spring EL 4209	1:250 000
NTd 4185	Top Spring EL 4209 Sample location plan	1: 50 000
NTd 4186	Bauhinia Yard Prospect Outcrop geology	1: 25 000

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Appendix 1

INDICATOR MINERAL SAMPLING DATA

16-JUL-86

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*       *****  *****  *****  *****  *****
*         *    *        *    *      *   *
*         *    *****    *    ****   *****
*         *         *   *    *      * *
*****   *****  *****    *    *****  *  **
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A PROGRAM IN THE GASP SYSTEM TO
PRINT A LISTING OF A DATA SET

VERSION 4.0 AUG 1983.

DATA TITLE: McARTHUR BASIN SAMPLING/I.M. RESULTS 1984-85-86

LISTING OF ARCHIVAL INFORMATION FOR THE INPUT DATA

KIANA CAMP 1/1984 (May-June)
RECONNAISSANCE EXTENSION, INFILL AND FOLLOW-UP SAMPLING
KIANA AREA FOLLOW-UP INVESTIGATIONS (June-November 1984)

SAMPLE NOs.	DPO NOs.
1081866 - 1081915	21902, 21904,
1081924 - 1082228	21906-911
1082235 - 1082278	(20926 geochem)

PERSONNEL: I.C.Colliver, K.R.Alexander, D.A.Sims

SAMPLE NOs.	DPO's
1082406 - 1082409	21911, 21912
762252 - 762266	21917
1083137 - 1083145	21925
1083154 - 160	21920
1083167 - 179	
1083187 - 194	21919
1083195 - 1083200	21918, (20928 pet.) (20927, 20929 geochem)
681610, 611, 614	21940, (21930 ")
641616, 617	21396, (21397 ")

PERSONNEL: I.C.Colliver, S.L.Allnutt, D.A.Sims, B.E.Harvey

Extension of reconnaissance drainage sampling coverage (at ~1 : 12km2 sample density) over the Bukalara Range area, infill drainage sampling in peripheral areas of previous reconnaissance sampling, follow-up of positive results of previous sampling and ground investigation and sampling of magnetic anomalies selected from 1983 airborne surveys. Drainage trap site selection, aeromagnetic anomaly and photocircular feature recovery, ground surveys and sample collection all helicopter supported.
Drainage samples sieved -2mm (generally 1x20kg bag per site) Kraft packet -80mesh geochemical sample of active drainage sediment sieved on site.
Loam samples comprise 3-5 bags per site of (-2mm) deflated surficial soil, shallowly scraped over areas of several m2.

TOP SPRING DRILLING PROGRAM (November 1984)

SAMPLE NOs. 762851 - 762863
DPO NO. 21935
PERSONNEL: B.E.Harvey
Scout drilling of features TSP 2, TSP 5, TSP 7 and TSP 9
Program contracted by Gaden Drilling Pty.Ltd. (Fox LS22 rig)
Use was specified of DD core bits set only with synthetics
Precollar cuttings and half-core samples represent intervals variably 1-12m, keyed on drill logs DD84TS-1, DD84TS-2, DD84TS-3, DD84TS-4, DD84TS-7, DD84TS-9

KIANA CAMP 1/1985 INFILL AND FOLLOW-UP SAMPLING
(April-May, May-June, August-November)

SAMPLE NOs. 1081704 - 1081748	DPO's	21942, 21943, 21945 (21948 geochem), 21949
1084081	DPO	21941
970806, 970807		21949
762867		21950
1084101 - 1084200	DPO's	21944, 21949
1084335 - 4499		21949, 21950
970857 - 970862		22027

PERSONNEL: I.C.Colliver, J.P.Howard, J.H.Lew, S.P.Susden, S.L.Allnutt
Follow-up of positive results of previous sampling in areas of EL's 4209, 4327, 4410, 4550 and 4692 and increasing sampling density throughout the area (aiming at about 1 : 12 km2)
Trap site selection and sample collection helicopter supported
Drainage samples sieved -2mm (1-5 x 20 kg bags per site)
Kraft packet -80mesh geochemical sample sieved on site from active drainage sediment

KIANA CAMP 1/1986 FOLLOW-UP SAMPLING (April-May)

SAMPLE NOs. 1084835 - 1084998	DPO's	37601-605
1312001 - 1312007		(37610 geochem)

PERSONNEL: I.C.Colliver, L.A.LeMesurier
Follow-up of positive results of previous sampling in areas of EL's 4209, 4327, 4410, 4550 and 4692, extension/infill of reconnaissance drainage sampling over ELA 4989 and 4990 areas and "loam" and rock chip sampling of ground recovered magnetic and radiometric airborne survey anomalies, DAEDALUS and airphoto features
Airborne geophysical survey anomaly, DAEDALUS feature and photofeature recovery, drainage trap site selection and sample collection helicopter supported
Loam samples composited of 5 bags of (-2mm) surficial soil, shallowly scraped over an area of several m2
Drainage samples sieved -2mm (1-5 x 20 kg bags per site)
Kraft packet -80mesh geochemical sample sieved on site from active drainage sediment

LABELS LEGEND

EAST	|
	| A.M.G. coordinates (km) including zone
NORTH	|
SAMTYPE	SAMPLE TYPE
	coded 1 = drainage (1.2 = pan con.)
	2 = loam
	3 = rock 3.1 = outcrop
	3.2 = float
	3.3 = auger cuttings
	3.4 = RD/PD
	3.5 = DD core
SAMKG	SAMPLE WEIGHT (kg)
IND1	KIMBERLITIC INDICATOR MINERAL GRAINS OBSERVED
	(1.D = 1 diamond)
	(1.CR = 1 chromite)
IND2	INDICATOR MINERAL #2 OR OTHER MINERAL OF INTEREST
MICROD	NUMBER OF MICRODIAMONDS RECOVERED

********** INFORMATION ADDED BY CRUNCH **********

** COORDINATE TRANSFORMATION
THE LOCAL GRID VARIABLES EAST AND NORTH WERE TRANSFORMED TO
AMG COORDINATE VARIABLES EASTAMG AND NORTHAMG IN ZONE 53

THE FOLLOWING SELECTION CRITERIA WILL BE SATISFIED IN THIS RUN.

SAMPLES WITH
EASTAMG BETWEEN 567000.000 AND 592500.000
AND
NORTHAMG BETWEEN 8107000.000 AND 8130000.000
WILL BE SELECTED.

SAMPLE NO.	EASTAMG	NORTHAMG	SAMTYPE	SAMKG	IND1	IND2	MICRO
1081901	577800	8114300	2	12.2	0	0	0
1081902	577800	8114300	2	12	0	0	0
1081903	577800	8114300	2	12.4	0	0	0
1081904	577800	8114300	2	12.2	0	0	0
1081905	577800	8114300	2	13.6	0	0	0
1081906	577699	8114100	2	18.3	0	0	0
1081907	577699	8114100	2	20	0	0	0
1081908	577699	8114100	2	19.7	0	0	0
1081909	577699	8114100	2	21.3	0	0	0
1081910	577699	8114100	2 15	19.6	0	0	0
1081911	580000	8116400	2	20.3	0	0	0
1081912	580000	8116400	2	14.7	0	0	2
1081913	580000	8116400	2	16	0	0	0
1081914	580000	8116400	2	21.4	0	0	0
1081915	580000	8116400	2	15.2	0	0	0
1082046	582000	8114000	1	19.7	0	0	0
1082047	582000	8114000	1	18.5	0	0	0
1082048	580398	8109900	1	21.3	0	0	0
1082049	580398	8109900	1	20.5	0	0	0
1082050	580398	8109900	1	23.2	0	0	0
1082051	579601	8114900	1 10	18.2	0	0	0
1082052	579601	8114900	1	19.8	0	0	0
1082053	579199	8114700	1	22.2	0	0	2
1082054	579199	8114700	1	20.4	1.D	0	0
1082055	579199	8114700	1	23.3	1.D	0	0
1082190	583398	8123500	2	9	0	0	0
1082193	583398	8123500	2	9.2	0	0	0
1082194	583398	8123500	2 5	7.8	0	0	0
1082195	583398	8123500	2	8.8	0	0	0
1082196	583398	8123500	2	10.6	0	1.Au	0
1082202	591800	8112400	1	19.1	0	0	0
1082203	590101	8114900	1	18.6	0	0	0
1082205	571800	8119300	1	17.3	0	0	0
1082206	574199	8114800	1	23.4	0	0	0
1082207	575398	8115600	1 9	20.7	0	0	0
1082208	575898	8115500	1	22.5	0	0	0
1082209	577101	8117900	1	22.6	0	0	0
1082215	591398	8111800	1	22.8	2.CR	0	0
1082216	590601	8109600	1	19.1	0	0	0
1082409	586500	8114400	3	102.3	0	0	0
1083195	582300	8114300	3	22.2	0	0	0
1083196	582300	8114300	3 7	23.4	0	0	0
1083197	582300	8114300	3 7	22.1	0	0	0
1083198	582300	8114300	3	22.2	0	0	0
1083199	582300	8114300	3	20.9	1.CR	0	0
1083200	582300	8114300	3	19.9	0	0	0
762851	580398	8116100	3.4	7	0	0	0
762852	580398	8116100	3.4	12.6	0	0	0
762853	580398	8116100	3.5 4	12.2	0	0	0
762854	580199	8116300	3.4	8.4	0	(SYNTH)2	

SAMPLE NO.	EASTAMG	NORTHAMG	SAMTYPE	SAMKG	IND1	IND2	MICRO
762855	580199	8116300	3.4	8.4	0	0	0
762856	580199	8116300	3.5	18	0	0	0
762857	578101	8114700	3.4	13.8	0	0	0
762858	578101	8114700	3.5	10.2	0	0	0
762859	582898	8115000	3.4	12.4	0	0	0
762860	582898	8115000	3.4	11.6	0	1.D(SYNTH)	11
762861	583398	8123400	3.4	16	0	(SYNTH)	1
762862	583398	8123400	3.5	4.9	0	(SYNTH)	4
762863	582300	8114600	3.4	13.8	0	0	0
1081713	591500	8111800	1	87.3	1.CR	0	0
1081714	587300	8113300	1	50.2	0	0	0
1081715	586500	8114200	1	45	0	0	0
1081716	586898	8113900	1	54.3	0	0	0
1081717	578800	8113800	3	164.7	0	0	0
1081718	578800	8113800	3	153.4	0	0	2
1081719	578800	8113800	3	31.2	0	0	0
1081720	586699	8114600	1	58.5	0	0	1
1081738	585300	8117800	1	106	0	0	0
1081739	576500	8110900	1	95.8	0	0	0
1081740	576101	8110900	1	57.7	0	0	0
1081741	576101	8111500	1	95.4	0	0	0
1081742	576199	8112600	1	99.4	0	0	0
970857	578199	8112200	1	24.4	0	0	0
970858	578699	8113100	1	17	0	0	0
970859	578898	8113600	1	24.5	0	0	0
1084150	571000	8119900	1	17.4	0	0	0
1084152	579500	8129700	1	16.4	0	0	1
1084155	574000	8126300	1	17.8	0	0	0
1084156	582199	8128500	1	16.4	0	0	0
1084157	589300	8126600	1	19.4	0	0	0
1084158	589398	8127400	1	20.1	0	0	0
1084161	574500	8126900	1	19.8	0	0	0
1084162	582500	8128600	1	19.6	0	0	0
1084163	589000	8126500	1	23.8	0	0	0
1084345	590800	8124100	1	19.1	0	0	0
1084346	586800	8124800	1	16.5	0	0	0
1084354	586000	8124100	1	18.5	0	0	0
1084357	567199	8127600	1	19	0	0	0
1084981	578800	8113800	3.1				
1084982	586400	8115100	3.1				

END

NUMBERS THAT ARE CODED REPRESENT "SPECIAL VALUES". THESE VALUES WILL BE EXCLUDED FROM ALL CALCUALTIONS IN THE GASP SYSTEM.

2

Appendix 2

GEMCODRILL AUGER LOGS

C.R.A. EXPLORATION PTY. LIMITED

AUGER

DRILL CUTTINGS LOG

PROJECT BAUHINIA TRUCKING YARD

TOP SPRING EL 4209

CO-ORDINATES (AMG) GRID ORIGIN 789.0E 8113.7N — DRILLERS GRC — COMMENCED 29.10.85 — DEPTH — HOLE No.

LINE (S) 10 000mE — BEARING 000°MAG — DRILL TYPE GEMCO HT7 — COMPLETED 29.10.85 — CASING LEFT — DPC No(s)

COLLAR LINE	COLLAR ORDINATE	CORE REC. (M)	DEPTH FROM	DEPTH TO	DESCRIPTION	SPECIAL FEATURES WEATH., ALTERATION, FRACTURING VEINING, MINERALIZATION	SAMPLE No.	FROM (M)	TO (M)	MAG. SUSC. x10⁻⁵ SI	ASSAY VALUES SCINT
10000	10000N		0	0.8	Brown gritty black clay soil. Minor pebbles of ferruginous coated chert and ironstone at base.	Palaeo-gravel - though difficult to be certain.					
	10100N		0	1.5	Black clay - ironstone and chert nodular float, as at surface.						
			1.5	1.7	Yellow sandy clay.	Seen beneath black soil					
			1.7	1.8	Possible waterworn quartz sandstone & chert pebbles	profile in creek to south. Palaeogravel.					
	10200		0	1.8	Black clay minor quartz grit component.						
			1.8	1.9	Yellow clayey sandstone. Chert and ferrug. sandstone pebbles - though may only be "floaters".	Possible Palaeogravel.					
	10300		0	2.1	Black clay.						
			2.1	2.2	Weathered white limestone.	Top Springs - limestone in outcrop 120m west on eastern bank of creek. 1.5m thick section sab horizontally bedded.					
	10400		0	1.7	Black clay "soil" Rock at base - no sample returned.	V.heavy clays.					
	10500		0	1.7	Black clay overlying possible limestone.	Subcropping white-grey Top Springs limestone at 9980mE 10500mN. Ferruginous nodular cherty cap.-typical.					

SUMMARY AND SPECIAL COMMENTS

LOGGED BY S.L. ALLNUTT — DATE 27.10.85

AUGER **DRILL CUTTINGS LOG**

PROJECT BAUHINIA TRUCKING YARD
TOP SPRING EL 4209

CO-ORDINATES (AMG) GRID ORIGIN 789.0E 8113.7N DRILLERS GRC COMMENCED 29.10.85 DEPTH HOLE No.

LINE (S) 10900mN (NOMINAL) BEARING 110°MAG DRILL TYPE GEMCO HT7 COMPLETED 30.10.85 CASING LEFT DPO No(s)

COLLAR LINE	COLLAR ORDINATE	CORE REC. (M)	DEPTH FROM	DEPTH TO	DESCRIPTION	SPECIAL FEATURES WEATH., ALTERATION, FRACTURING VEINING, MINERALIZATION	SAMPLE No.	FROM (M)	TO (M)	MAG. SUSC. x10⁻⁵ SI	ASSAY VALUES Scint
					(FENCE LINE TRAVERSE - CO-ORDINATES FROM FENCE CROSSING						
					OF TOP SPRING CREEK NOMINALLY AT 10900mN 10000mE)						
10900	10000E				No hole - outcropping travertine coated flat-lying	Top Springs Limestone					
					limestone in creek bed. Very minor redisual cap of						
					ferrug. palaeogravel evident on Lst. pavement in						
					creek-bed 30m upstream of fence.						
	10025E		0	1.7	Black clay "soil".						
			1.7	1.9	Yellow gritty variant of black soil; possibly the						
					kadinized sandstone observed elsewhere. Few						
					waterworn exotic chert and ferruginous sandst. pebbles.	- suspect floaters.					
						Possible palaeogravel.					
	10100E		0	1.8	Black clay "soil".						
			1.8	2.1	Yellow clayey qtzose sands with calcite (2ny.)						
					crystals. Vague bedding-planes observed in chips.	?Limestone.					
	10200E		0	1.9	Grey-fawn gritty clay.						
			1.9	2.3	Progressively yellow-mustard clayey sediment - flakey cuttings - unique to date.						
					Small white limestone pebbles at base.	Limestone.					
	10300E		0	2	Grey-fawn gritty clay.						
			2	4	Yellow-white, calcite flecked, clays bearing gritty						
					quartz sand. Reminicent of kaolinized sandstone						
					overlying palaeogravel/chert in creek bed near	?Palaeogravel?					
					and to south of origin. White liminated cherty						
					and sandstone pebbles.						
	10400E		0	2.4	Grey-black clay "soil".						
			2.4	2.8	Yellow-mustard clayey grit - same as 300E - no gravel	Slightly damp. V.stickey.					
					Calcrete at base.						
	10500E		0	2	Black clay.						
			2	2.5	Calcrete layer overlying yellow gritty sands as for						
					previous two holes.						
	10600E		0	2	Black clay.						
			2	2.1	Stickey yellow clay - minor grit content.						
	10700E		0	2	Cohesive black clay.						
			2	2.8	Yellow gritty clay.	Heavy augering.					
			2.8	4.9	As 2-2.8 appears to be kaolinised quartz sandstone.						
			4.9	5.1	Brown-yellow weathered kaolinitic sandstone.	1 pebble of rounded chert					
					Angular chips of brown-grey chert - same as	All possible efforts made for					
					seen in creek 1.4km s.s.w. of origin where it	max penetration - 2¼ hrs to					
					outcrops as horizontally bedded and overlain by	complete.					
					kaolinitic sandstone.						

SUMMARY AND SPECIAL COMMENTS

LOGGED BY S.L. ALLNUTT DATE 20.10.85

AUGER

DRILL CUTTINGS LOG

TOP SPRING EL 4209

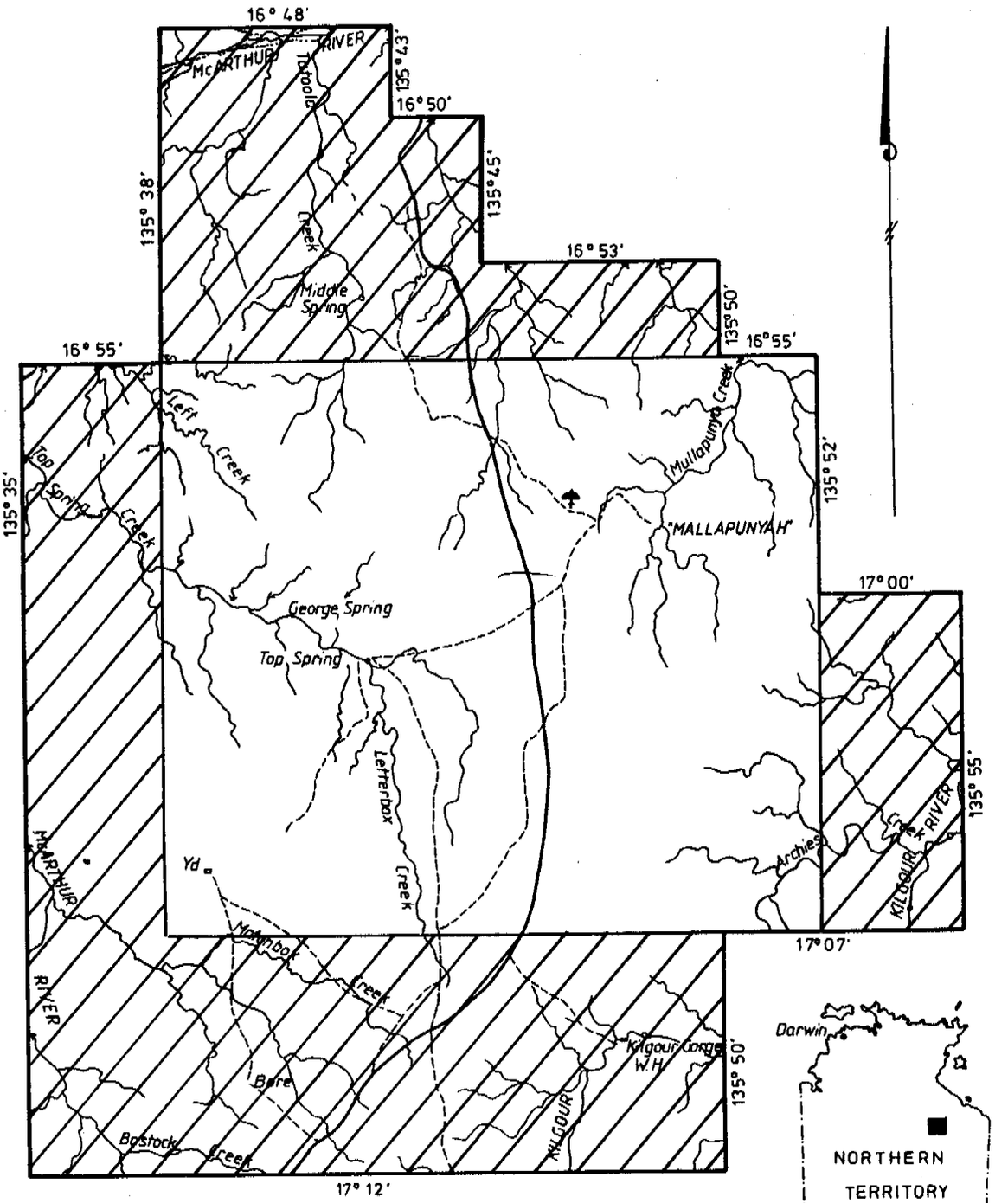
CO-ORDINATES (AMG) GRID ORIGIN 789.0E 8113.7N DRILLERS GRC COMMENCED 29.10.85 DEPTH HOLE No.

LINE (S) 10900mN (NOMINAL) BEARING 110° MAG DRILL TYPE GEMCO HT7 COMPLETED 30.10.85 CASING LEFT DPO No(s)

COLLAR LINE	COLLAR ORDINATE	CORE REC. (M)	DEPTH FROM	DEPTH TO	DESCRIPTION	SPECIAL FEATURES WEATH., ALTERATION, FRACTURING VEINING, MINERALIZATION	SAMPLE No.	FROM (M)	TO (M)	MAG. SUSC. x10⁻⁵ SI	SCINT	ASSAY VALUES
10900	10800E		0	2.1	Black clays "soil".							
			2.1	2.5	Yellow gritty clays/sand.							
	10900E		0	2	Black clay.							
			2	2.4	Yellow sandy clay. Calcrete chips.							
	11000E		0	2.1	Black clay.							
			2.1	2.4	Yellow sandy clays. Calcrete chips.							
	11100E		0	2	Black clay.							
			2	2.3	Yellow sandy clays.							
	11200E		0	2.4	Black clay.							
			2.4	5	Damp stickey yellow clay, minor calcrete chips.	Hard base - no sample.						
	11300E		0	2.4	Black clay.							
			2.4	3.3	Red-brown to orange below 2.7m clay, bearing pisolites (ferrug.) Chert band at 2.7m. Chert? at 3.3m.	terra-rosa?? V. stickey.						
	11400E		0	2.8	Black clay.							
			2.8	3.1	Red-brown clays. Chert "nodules".	Possible gravels.						
	11500E		0	2.6	Black clay.							
			2.6	4								
					TRAVERSE 2 - Commenced @ 9500mE 11000mN on fence at western margin of sandstone c/c.							
10900 (NOMINAL)	9400E		0	1.2	Fawn-gray clay.							
			1.2	2.3	White weathered sandstone, minor brown clay/grit							
			2.3	2.4	Yellow weathered clayey sandstone. Sst at base.							
					All further holes cancelled due to rain 31.10.85.							

SUMMARY AND SPECIAL COMMENTS

LOGGED BY S.L. ALLNUTT DATE 30.10.85



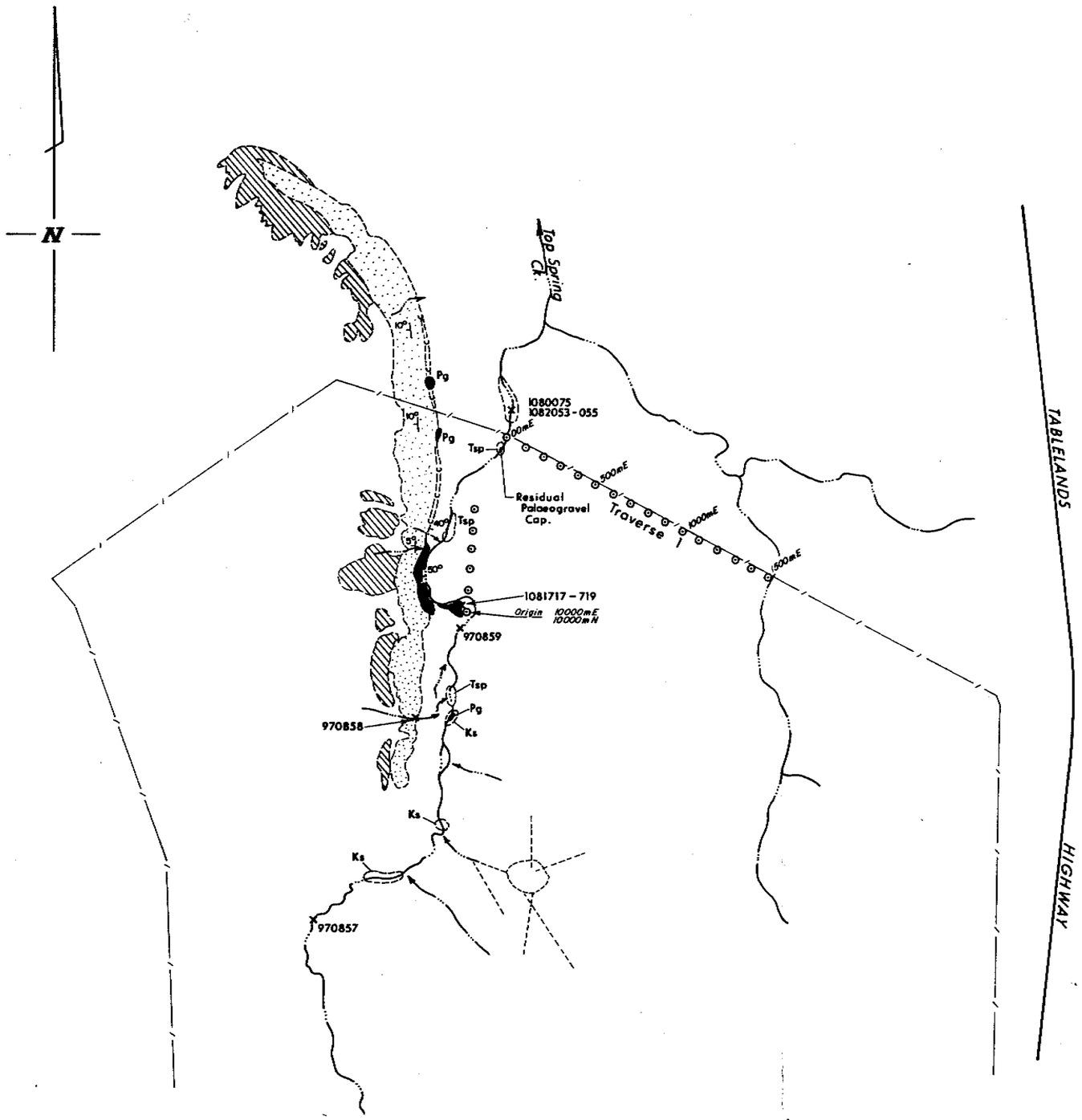
CRA EXPLORATION PTY LIMITED

REDUCTION of AREA

TOP SPRING

EL 4209

REFERENCE SE53-3 BAUHINIA DOWNS/SE53-7 WALLHALLOW	
SCALE 1: 250,000	DATE JUNE 1985
AUTHOR ICC	REPORT 130655
DRAWN SRJ	PLAN No NTd 3980



LEGEND

- Creeks
- Geological outcrop boundary
- 5° Dips
- Vague linears / circular feature
- Fence
- × 970857 Drainage / Rock chip sample
- ⊙ ⊙ ⊙ Fence of Auger holes

LITHOLOGIES

- Black soil plains
- Red soil, pisolite scree
- Ks Kaolinised sandstone
- Palaeogravels silicified (Pg)
- Tsp Silicified white limestone
- Silicified sandstone
- Cherty laminated dolostones

MAP BASE 1:25000 Air Photo CAG/C 1003, Run 2, No. 8119.

CRA EXPLORATION PTY LIMITED

E.L. 4209 — TOP SPRINGS
OUTCROP GEOLOGY
BAUHINIA TRUCKING YARD PROSPECT

REF.	WALLHALLOW SE 53-7		
SCALE	1 : 25000	DRAWN	R.D.D.
AUTHOR	S.L.A.	REPORT	130655
DATE	Dec. '85	PLAN No	NTd 4186

16° 55'

135° 38'

135° 52'

HIGHWAY

TABLELANDS HIGHWAY

Creek

Gravel

Aerodrome
TSP 2
1082190 L
193 L
194 L
195 L
196 L

Mallapunyah

George Spring

Top Spring

Dilfingtons Bore

Darkie Plain Bore

Bauhinia Bore

Lettenbox Creek

Donkey Hole Yard

Archies Creek

Matchbox Creek

Archie Yard

Kilgour Gorge Waterhole

KILGOUR

BM 181

BM 201

BM 204

BM 217

CRA EXPLORATION PTY. LIMITED

EL 4209 - TOP SPRING

SAMPLE LOCATION PLAN

REFERENCE: SE 53-3 BAUHINIA DOWNS / SE 53-7 WALLHALLOW	
SCALE: 1:50,000	DATE: JULY 1986
AUTHOR I.C.C.	REPORT 130655
DRAWN S.R.J.	PLAN No. NTd 4185