Ms Wendy Beggs
Assistant Chief Legal Adviser
Directorate of Legal Services
2 Franklin Street
BELFAST
BT2 8DQ

Your Ref: NSCB04/1

Our Ref: AD-0135-10

Date: 21st May 2010

Dear Ms Beggs,

Re Investigation into the death of Adam Strain

I refer to the above.

I would be grateful if you would obtain the following information from your client, the Belfast Trust:

1. An explanation of the issue of the ligation of the left internal jugular vein, previously raised in correspondence between the Inquiry and Brangam, Bagnall & Co, previous solicitors for your client. I have attached a copy of that correspondence for your ease of reference. Therein you will note that it is stated that;
"There is no record of the left internal jugular vein being tied off in the RBHSC notes. It is the view of our client that this was not carried out and certainly not during the transplant on 27 November 1995."
Adam's mother believes that Adam's left internal jugular vein was tied off at the same time as a Broviac central line (inserted on 29th May 1992) was removed, on the 9th February 1995. In any event, Dr Alison Armour states in her Report of Autopsy (copy attached) that;

   "The autopsy revealed ligation of the left internal jugular vein".

   Clearly this is in conflict with the view of your client's view. I would be grateful if you would state the basis for.

   I would be obliged for your clients' comments on the possibility that the left internal jugular vein was mistakenly tied off during either the procedure of the 29th May 1992 or 9th February 1995.

Secretary: Raymond Little **Deputy Secretary:** Bernie Conlon
Arthur House, 41 Arthur Street, Belfast, BT1 4GB
Email: inquiry@ihrdni.org **Website:** www.ihrdni.org **Tel:** 028 9044 6340 **Fax:** 028 9044 6341

2. A copy of the CVP readings covering the entire period of Adam's transplant surgery which took place on Sunday 27th November 1995.

3. The make, model and age of the blood gas analyser machine used to take Adam's electrolyte levels at 9.32am on 27 November 2005, together with a copy of the maintenance log for the machine. I attach a copy of the relevant printout (reference 058-003-003).

4. Confirmation of whether or not there was a protocol in place in the RBHSC in 1995 regarding the practice for the giving and recording of information to parents and children regarding treatment the child was to receive. Should there be such a document, please forward me a copy.

I would be obliged for you response no later than Friday 5th June 2010.

Yours sincerely,

Anne Dillon
Solicitor to the Inquiry

BRANGAM BAGNALL & CO.

Solicitors

Commercial Mews, 69-71 Comber Road, Dundonald, Belfast BT16 0AE
Tel: [redacted] Fax: [redacted] DX No. 3873NR
e-mail: advice[redacted] www.brangam-bagnall.co.uk

OUR REF: RGH/A/15/GB

YOUR REF: FC-37-05

26 April 2005

Ms Fiona Chamberlain
Solicitor
Inquiry into Hyponatraemia-related Deaths
3rd Floor
20 Adelaide Street
BELFAST
BT2 8GB

Dear Ms Chamberlain

INQUIRY INTO HYPONATRAEMIA-RELATED DEATHS
THE NEXT OF KIN OF ADAM STRAIN (DECEASED)

I refer to previous correspondence in connection with the above and acknowledge receipt of your letter of 11 April 2005, together with the copy of correspondence of Messrs McCann & McCann, Solicitors, dated 6 April 2005.

There is no record of the left internal jugular vein being tied off in the RBHSC notes. It is the view of our client that this was not carried out and certainly not during the transplant operation on 27 November 1995.

The child had a Broviac central line inserted at operation on 29 May 1992 (RGH 8, page 52 - copy enclosed). This was a procedure which involved an incision in the left side of the neck and an incision in the chest where the line entered the body through the skin. The incision in the neck was created to access the common facial vein which was tied off. The central line was inserted through the common facial vein into the internal jugular vein and thence to the superior vena cava (SBC in the Operation Notes). This procedure specifically spared the internal jugular vein which was not sutured. The suture material is recorded as PDS (an absorbable suture). The Broviac line remained in place until it was removed because of infection on 9 February 1995 (RGH 12, page 189 - copy enclosed). The neck incision was not reopened and the suture referred to (RGH 12, page 147 - copy enclosed) was used to close the chest site.

Also at Hildon House, 30-34 Hill Street, Belfast BT1 2LB
Telephone [redacted] *Fax* [redacted] *DX No. 485NR* *e-mail: advice*[redacted]

Partners
George D. H. Brangam
Gary Daly

Associates
SA Crothers
Eimer Coll

Solicitors
Peter Bowles
Gillian McCreery
Brenda Loughrey
Sinead Owens

I trust that you find this explanation helpful. Should you require further assistance or documentation, please do not hesitate to contact me.

Yours sincerely

Gary Daly
for Brangam Bagnall & Co
[redacted]

Encs

GD-TT-26-04-05

DATE	CLINICAL HISTORY, EXAMINATION AND PROGRESS
	— Send MSU. —
2.2.95	Teicoplanin level = 19.1
9/2/95	For Removal of Central line today
	- Consent
	- U&E
	9/2
9/2/95	- Booked volume for removal of central line
	- Feeding well
	- ° complaint
	O/E : chest clear
	abdomen NAD
	obs stable
	- Consent ✓
	- U&E ✓
	- tissue lytum ✓
	OPERATION NOTE S AAD / CATISANNA
9/2/95	Broviac line removed under GA
	Retentive dressing done
	cuff & catheter tip sent for culture
	9/2
14.2.95.	Feeding clinic initial Assessment - see report letter enclosed. Julie [illegible]

SPEECH THERAPY DEPARTMENT
Tel. [redacted] Exts. [redacted]

WNC 762/OS 4043

THE ROYAL HOSPITALS
Belfast BT12 6BA

SWAB COUNT

PLEASE AFFIX LABEL OR ENTER

FULL NAME ....ADAM STRAIN....
HOSPITAL NUMBER ....364377....
CONSULTANT ....Potts.....

OPERATION Removal Central Line

DATE: 9/2/95

THEATRE: Anaes. Room.

SCRUBBED NURSE:

SURGEON:

SWABS:

Abdominal	18" x 18"	
"	12" x 12"	
Raytec Swabs	4" x 4"	10
	2" x 2"	
	6" x 1"	
	6" x 4"	
	Lint Strips	
	Patties	
	Prostatic Packs	

Other Types:—

Packs:—

Purce Dissector Swabs:

Pre-op check J Kirkpatrick

Tape:—

Suture Needles:— X 1.

Instruments:—

Drain Inserted:—

SWABS INSTRUMENTS SUTURE NEEDLES, ETC. CORRECT

Scrubbed Nurse's Signature.. Runner's Signature..

Surgeon's Signature ....

WMX 318/OS 3217

OPERATION NOTES

Affix label or enter

Adam Strain 364377 Musg. Wd.

Operation performed: Insertion Central Line, Cystoscopy & Retrograde Pyelogram. Date: 29/5/92

Surgeon: Mr W A McCallion / Mr R J Stewart/Mr S Brown Anaesthetist: Dr MCCarthy/Crean

Assistant: Sister Malcolmson

Incision:

Indication: Pre base bilateral ureteric reimplant. Left ureter sloughed?

Findings: requiring left to right TUO now presents with recurring UTI's query due to obstructive uropathy . Requires long term antibiotics.

Procedure:

1) Insertion Broviac Line into left common facial vein. Transverse cervical incision. Left common facial vein identified, entering left internal jugular. Left common facial ligated with 5 X 0 PDS. Broviac line tunnelled from anterior chest wall using Westminster and inserted into common facial vein and then internal jugular. Check X-ray confirmed tip of broviac line in proximal SBC. Neck wound closed in layers of 5 X 0 PDs and wound anterior chest wall closed 5 X 0 PDS.

2) Cystoscopy using 30° telescope and 11 storz sheath. The right ureteric orifice was identified in the mid line approx at the level of inter ureteric bar. No lesion was found within the bladder. The UO was easily catheterised with a size 3 ureteric catheter. The cystoscope was withdrawn and the baby returned to X-ray for retrograde pyelogram.

W A McCallion

CMcI

Blood:

Closure:

Drains:

Royal Belfast Hospital for Sick Children
Belfast, BT12 6BE

Form No. M111

C1

THE QUEEN'S UNIVERSITY OF BELFAST
NORTHERN IRELAND OFFICE

REPORT OF AUTOPSY

Name: Adam STRAIN **Sex:** Male **Age:** 4 yrs. **F.No:** 46,728

Date of Death: 28th November, 1995. MDEC

Date and Hour of Autopsy: 29th November, 1995. 2.40 p.m.

Place of Autopsy: The Mortuary, Royal Victoria Hospital, Belfast.

CAUSE OF DEATH:

I (a) CEREBRAL OEDEMA

due to

(b) DILUTIONAL HYPONATRAEMIA AND IMPAIRED CEREBRAL PERFUSION DURING RENAL TRANSPLANT OPERATION FOR CHRONIC RENAL FAILURE (CONGENITAL OBSTRUCTIVE UROPATHY)

On the instructions of H.M. Coroner for Greater Belfast, Mr. J. L. Leckey, LLM, I, Alison Armour, MB, BCh, MRCPath, DMJ(Path), registered medical practitioner and pathologist approved by the Northern Ireland Office, made a postmortem examination of the body of -

ADAM STRAIN
aged 4 years

identified to me at the Mortuary, Royal Victoria Hospital, Belfast, on Wednesday, 29th November, 1995, by Constable S. R. Tester, R.U.C. Grosvenor Road.

011-010-034

AS – CORONER

THE QUEEN'S UNIVERSITY OF BELFAST
NORTHERN IRELAND OFFICE

REPORT OF AUTOPSY

Name: Adam STRAIN Sex: Male Age: 4 yrs. F.No: 46,728

Date of Death: 28th November, 1995. MDEC

Date and Hour of Autopsy: 29th November, 1995. 2.40 p.m.

Place of Autopsy: The Mortuary, Royal Victoria Hospital, Belfast.

HISTORY:

He was a child and lived with his mother and grandparents in a bungalow in the town. He was born with a renal abnormality - an obstructive uropathy which resulted in polyuric renal failure. He had five ureteric reimplant operations, a fudoplication for gastro-oesophageal reflux and more recently in October, 1995 an orchidoplexy. He ate nothing by mouth and was fed via a gastrostomy button 1,500 mls. at night and 900 mls. during the day. He also received peritoneal dialysis. He was being prescribed calcium carbonate, Keflex, iron, one alpha vitamin, sodium bicarbonate and erythropoietin.

On 26th November, 1996, he was admitted to the Royal Belfast Hospital for Sick Children at 11.30 p.m. for a renal transplant operation. His blood pressure was 108/56 and a haemoglobin of 10.5 g/dl with a sodium of 139 mmol/1, potassium 3.6 mmol/1 and urea 16.8 mmol/l. Overnight he was given 900 mls. dioralyte (4% dextrose 0.18% saline). Peritoneal dialysis was performed as usual , 750 ml. fluid volume 1.36% dextrose solution. He was given 8 cycles before going to theatre the next morning.

He arrived in theatre at 6.45 a.m. and general anaesthesia was induced using thiopentone, atropine and atracium. Intravenous access was difficult and attempts were made to pass a central venous pressure catheter. Three attempts were made with the left subclavian vein, one with the left internal jugular vein and then the catheter was successfully passed into the right subclavian vein. A lumbar epidural between L1 and L2 was also sited with 0.25% bupivacaine and Fentanyl 5 mcg/kg. Apart from the anaesthetic drugs Augmentin an antibiotic, prednisolone, asathioprin (anti-rejection drug) and a continuous infusion of dopamine were administered intravenously. An initial central venous pressure reading was taken at 17 mm.Hg. Intravenous units were administered from 7.00 a.m. to 8.30 a.m., of three 500 ml. bags of dextrose saline (4% and 0.18%). The operation technically was difficult due to previous surgical procedures and there was an increase in blood loss, calculated to be approximately 1,200 mls. at the end of the procedure. Further fluids of 500 mls. Hartman's solutions 1,000 mls. of HPPF (human plasma protein fraction) and 500 mls. of packed cells were administered. At 9.32 a.m. a blood gas analysis revealed a sodium of 123 mmol/l (normal 135 - 145) and a haematocrit of 18% (normal. 35 - 40%). During the procedure the CVP rose to 20 -21 mm.Hg, the Hb was 6.1 g/dl which was 10.1 g.dl. at the end of the procedure and the blood pressure rose and the pulse rate gradually decreased. The donor kidney perfused and the operation was completed. At the end of the procedure the neuromuscular block was reversed with neostigmine but this boy did not wake up. His pupils were noted to be fixed and dilated at midday. He was transferred from theatre to the paediatric Intensive Care Unit at 12.05 p.m. He was intubated and hand ventilated on admission. He was treated with intravenous mannitol and intravenous fluids were restricted. An emergency CT scan at 1.15 p.m. revealed gross cerebral oedema. His body temperature was 36.5°C. the CVP was 30, heart rate 120 beats per minute and systolic blood pressure 120. Electrolytes revealed a

sodium of 119 mmol/l; and a chest X-ray revealed pulmonary oedema with the CVP catheter tip in a neck vessel. Neurologists carried out brain stem tests and life was pronounced extinct by a hospital doctor on 28th November, 1995 at 9.15 a.m.

EXTERNAL EXAMINATION:

The body of a young male child, 104 cm. in length and weighing 20 kilograms. Rigor mortis was present. Hypostasis of light purple colour stained the back of the body.

Back: There was a needle puncture mark in the midline, centred 11 cm. above the natal cleft, corresponding to an epidural cannula.

Eyes: The corneas had been taken for transplantation.

Ears: Normal.

Nose: Normal.

Neck: There was a needle puncture mark on the left side. There was a healed operation scar, 3 cm. long, on the left side. There were two further healed operation scars on the right side, 2.5 cm. long.

Chest : There was a needle puncture mark on the left upper chest, in the region of the subclavian vein. There were a number of bruised needle puncture marks on the right upper chest, corresponding to a subclavian line .There was a bruise, 1.5 x 1 cm., in the left upper chest, centred 3 cm. lateral and 1 cm. above the left nipple. There was a bluish-blackish bruise on the right chest, 2.5 x 1 cm., diameter, centred 3 cm. lateral to the right nipple.

Abdomen: There was a gastrostomy button situated in the left hypochondrium. The gastrostomy hole measured 6 mm. diameter. There was a healed operation scar, 18 cm. long, horizontally in the upper abdomen, corresponding to previous fundoplication. There was a further healed operation scar, 18 cm. long, traversing the mid-abdomen. There was a peritoneal dialysis tube in situ in the left upper abdomen. There were two further puckered scars, one situated in the left side of the lower abdomen, 5 cm. lateral and 2 cm. below the umbilicus. The other puckered scar was situated 4.5 cm. beneath the umbilicus. There was a recent elliptical surgical incision, 15 cm. long, on the right side of the lower abdomen with a drain protruding from its upper margin. Its edges were slightly bruised. A bladder catheter protruded from the lower end on the left side of the abdomen. There was a further drain in situ just at the level of the pubic bone, corresponding to the donor ureteric catheter.

Left Upper Limb: There were a number of bruised needle puncture marks in the fold of the elbow and a healed operation scar, 5 cm. long, again in the fold of the elbow.

Right Upper Limb: There were a number of bruised needle puncture marks in the fold of the elbow.

Left Lower Limb: There were a number of petechial bruises on the inner aspect of the thigh, in an area 4 x 1 cm. There was a bruise, 1 cm. diameter, on the front of the shin. There was a bruised needle puncture mark on the dorsum of the foot.

Right Lower Limb: There was a healed operation scar, 4 cm. long, in the right groin, corresponding to an orchidoplexy. There was a fading bruise, 0.5 cm. diameter, on the outer aspect of the upper thigh. There was a bluish bruise on the outer aspect of the thigh, 0.5 cm. diameter, and there were a number of fading bruises on the front of the shin. There were two bruised needle puncture marks on the dorsum of the foot.

Scrotum: There was a healed operation scar, 3 cm. long, on the right scrotal sac. The right testis had been removed. The left testis was present

INTERNAL EXAMINATION:

HEAD:

Brain: To be described after fixation.

Mouth: There were natural teeth in good condition in each jaw. The lips were dry and parchmented. The tongue was held between the clenched teeth.

Tongue, Pharynx: Normal.

NECK AND CHEST:

Hyoid Bone and Laryngeal Cartilages: Intact.

Thyroid Gland: Normal.

Pericardial Sac: Normal.

Heart: 120 gm. The organ was taken for transplantation.

Aorta: Normal.

ABDOMEN:

Abdominal Cavity: Was crossed by a number of adhesions. There was a little blood clot formation around the renal transplant on the right side.

Stomach: A gastrostomy hole was present. The stomach contained a little bile.

Intestines: Externally appeared normal.

Duodenum: Normal.

Liver: Weighed 875 gms. A little congested.

Gall Bladder: Normal.

Pancreas: Normal.

Native Kidneys: Both were markedly contracted, scarred and contained a number of cysts. Little normal functioning kidney remained. Both ureters were hugely distended and dilated.

Transplanted kidney: Was in situ in the right pelvis, the ureter drained freely and the vascular attachments were intact.

Bladder: Contained a little straw-coloured urine.

Prostate: Normal.

SPINAL CORD: To be described after fixation.

INTERNAL EXAMINATION OF NECK:

There was no evidence of congestion or obstruction of the major blood vessels or the carotid arteries and jugular veins. There was no evidence of superior vena caval obstruction. The carotid arteries were normal. There was a suture in situ on the left side of the neck at the junction of the internal jugular vein and the sub-clavian vein.

DESCRIPTION OF ORGANS AFTER FIXATION:

Brain - Was cut on 12.1.96

External Examination: Fixed weight of brain 1,680 gm; cerebellum and brain stem 176 gm; cerebellum only 154 gm. The brain was grossly swollen with loss of sulci and uncal swelling. This was symmetrical. There was no uncal necrosis. There was swelling of the cerebellar tonsils but no necrosis. There was no cortical venous thrombosis. The anatomy of the circle of Willis was normal.

On cut section there was massive brain swelling and constriction of the ventricles. There was no ventricular haemorrhage. There was no asymmetrical lesion. There was severe white matter congestion and marked congestion of the blood vessels in the basal ganglia, white matter and deep grey matter. There was no necrosis of the mid-brain or brain stem.

Blocks were taken from:

1. Right frontal white matter
2. Left cingulate gyrus
3. Left basal ganglia
4. Right and left hippocampus
5. Left occipital lobe
6. Cerebellum
7. Pons in toto
8. Thalamus

The brain was photographed sequentially

Cervical Cord: No macroscopical lesion seen.

Blocks were taken from:

1. Cervical
2. Thoracic
3. Lumbar

MICROSCOPY:

Lungs: There was congestion of the capillaries and there were moderate numbers of alveolar macrophages. There was no evidence of embolism or infarction.

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011-010-039

Larynx: There was ulceration of the mucosa, in keeping with intubation.

Liver: There was no evidence of cyst formation within the portal tract. There were scattered foci of clear cell change.

Kidney: There was widespread scarring and cyst formation, interstitial fibrosis and chronic inflammation. There was widespread glomerulo-sclerosis and the arterioles were thickened.

Transplanted Kidney: There was complete infarction.

Spleen: There was congestion of the red pulp.

Lymph Node: Normal.

(The above slides were seen by Professor J. Berry, Consultant Paediatric Pathologist).

Brain: There was massive cerebral oedema of the cortex and white matter. There was no evidence of terminal hypoxia. There was no evidence of myelinolysis.

Spinal Cord: No specific pathological features were noted.

(The brain, spinal cord and histological slides were seen by Dr. M. Mirakhur, Consultant Neuropathologist)

COMMENTARY:

This little boy with a past medical history of polyuric renal failure, numerous hospital admissions and operations was admitted to hospital one evening for a renal transplant operation. He was fed via a gastrostomy and ate nothing by mouth. Usually he would receive 1,500 mls. a night and 900 mls. during the day. That night investigations included blood pressure 108/56, sodium 139 mmol/l and haemoglobin 10.5 g/dl. Overnight he was given 900 mls. dioralyte (4% dextrose 0.18% saline) and peritoneal dialysis was performed as usual. He went to theatre the next morning.

General anaesthesia was induced. Intravenous access was difficult and four attempts were made to pass a central venous pressure catheter before it was successfully passed into the right subclavian vein. A lumbar epidural was also sited with .25% bupivacaine and fentanyl. An initial CVP reading was taken at 17 mm.Hg. and intravenous fluids were given of 3 x 500 ml. bags of dextrose saline (4% and .18%). The operation itself was technically difficult due to the previous surgical procedures and there was an increased blood loss calculated to be approximately 1,200 mls. This was replaced by intravenous fluids of 500 mls. of Hartman's, 1,000 mls. HPPF and 500 mls. of packed cells. At 9.32 a.m. a blood gas analysis revealed a sodium of 123 mmol/l (normal 135-145) and a low haematocrit. During the operation the CVP increased to 20-21 mm.Hg., the haemoglobin fell to 6.1 g/dl., the systolic blood pressure rose to 150 mm.Hg. and the pulse gradually fell but rose steadily from 10.15 a.m. onwards. When the procedure was completed and the neuromuscular block was reversed this little boy did not wake up. A CT scan of the brain revealed gross cerebral oedema. Brain stem function tests were carried out and he was declared dead a little over 26 hours from the start of the operation.

The autopsy revealed gross cerebral oedema. The fixed weight of the brain at postmortem was 1,680 gms., the average weight for a boy of this age being 1,300 gms and the average weight of a man's brain being 1,450 gms. It was the effects of this massive swelling of the brain which caused his death. There was no significant oedema of any other organ.

AS – CORONER **011-010-040**

This is a highly complex and difficult case. To try to understand the underlying cause for this cerebral oedema first some physiological mechanisms for maintaining fluid and electrolyte balance will be reviewed.

In healthy people the composition of body fluids vary within narrow limits. The kidneys are largely responsible for maintaining this constancy and the excretion of waste products of metabolism represents merely one aspect of this task. The control of water volume and sodium are maintained by the hormones A.D.H. (anti-diuretic hormone) and aldosterone.

In this case the volume of urine output was greatly increased and the urine was also dilute. This was probably due to the fact that the kidneys did not function and their ability to concentrate the urine was minimal.

Generalised cerebral oedema in children has many causes including hypoxia. In this case this has been excluded. The history indicates that during the operation this little boy received a quantity of intravenous fluids. There was also a considerable blood loss during the operation of 1,200 mls. However a CVP, central venous pressure, catheter was in situ in the right subclavian vein and is usually in place to avoid overloading of the circulation by intravenous fluids. A rise in the CVP indicates an excessive load and a fall can be an early sign of haemorrhage. In this case the initial reading was 17 mm.Hg. (for an operation such as this 10-12 mm.Hg. is the norm) and this was taken as the base line. A subsequent reading was a little higher again. Also during the operation the sodium was low along with the haematocrit. It is known that a condition called dilutional hyponatraemia can cause rapid and gross cerebral oedema. This is no doubt in this case that the sodium level was low during the operation. A study revealed that in children undergoing operations there was substantial extra renal loss of electrolytes and with a minimal positive balance of hypotonic fluid could lead to fatal hyponatraemia. This study however must be taken in context as it refers to healthy children undergoing operations like tonsillectomies. Thus they had normally functioning kidneys which was not the situation in this case. It seems likely therefore that the hyponatraemia in this case was the cause of the cerebral oedema and most of the intravenous fluids given in the cases sited in this paper were administered as 280 mmol glucose per litre in water or in sodium chloride 38 mmol/l.

Another factor to be considered in this case is cerebral perfusion. The autopsy revealed ligation of the left internal jugular vein. The catheter tip of the CVP was situated on the right side. This would mean that the cerebral perfusion would be less than that in a normal child. This would exacerbate the effects of the cerebral oedema and should also be considered as a factor in the cause of death. Therefore the most likely explanation is that the cerebral oedema followed a period of hyponatraemia and was compounded by impaired cerebral perfusion.

The autopsy also revealed changes in the kidneys, in keeping with chronic renal failure and total infarction of the transplanted kidney. These played no part in the fatal outcome.

There were marks due to treatment and bruises to both legs. They were trivial however.

REFERENCES:

Arieff et all
"Hyponatraemia and death or permanent brain damage in healthy children"
British Medical Journal 1992; 304; 1218-22

AS – CORONER

011-010-041

B G E REPORT

27 NOV 95 09:32

Acc.No 1713 B.P. 749mmHg
Arterial sample

PATIENT INFO

Name

Estimated Hb 6.1 g/dL

pH / BLOOD GASES

Measured at 37.0 °C

pH	7.348
pCO_2	44.1 mmHg
pO_2	125 mmHg

ELECTROLYTES

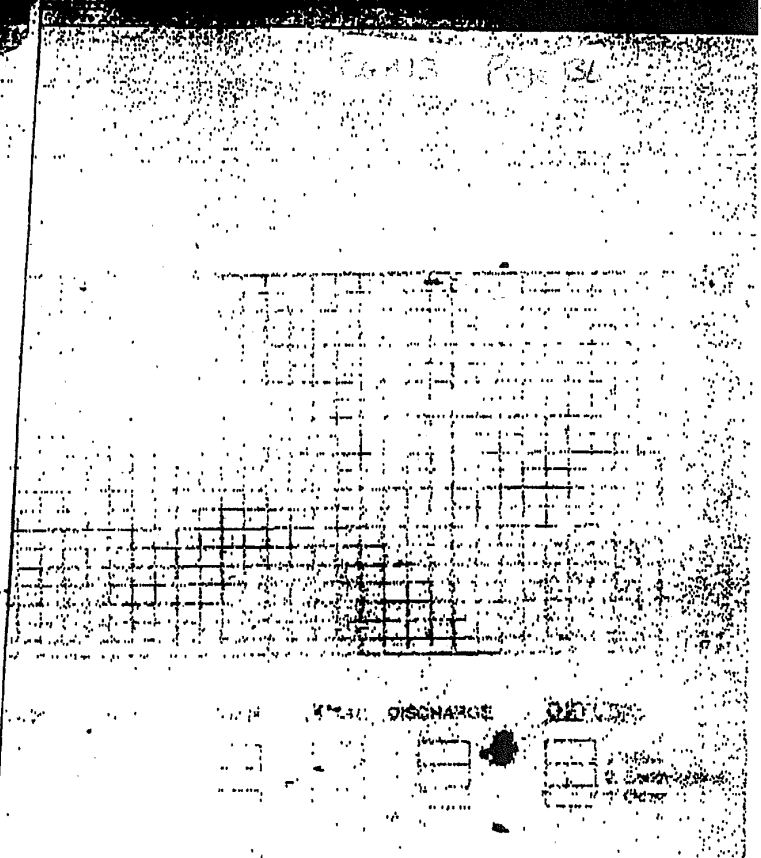
Na^+	123 mmol/L

HCT (conductivity)

Hct	18 %

CALCULATIONS

HCO_3^-	24.5 mmol/L
TCO_2	25.8 mmol/L
BE_b	-0.3 mmol/L
SBC	24.7 mmol/L
sO_2c	98.6 %



058-003-003

AS - ROYAL