June 7, 1973

Dr. Nathaniel F. Barr
Asst. Director for Measurement
and Evaluation
Division of Biomedical and
Environmental Research
U. S. Atomic Energy Commission
Washington, D. C. 20545

Dear Nat:

Enclosed are xerox copies of viewgraphs used at the RARG meeting in Livermore last month. They are for your own use or for distribution to anyone whom you, as chairman of the RARG, consider appropriate. All users, however, should understand the following points:

1. These are viewgraphs used during an oral presentation and, as such, present only an outline of procedures or a compression of data without amplifying or clarifying discussion. They are therefore an incomplete representation of the work that is being done.

2. Experimental data are preliminary and subject to change as analytical results become final.

3. These are all working documents that are being used in the evolution of the Survey Final Report and will, I expect, be used to generate the AEC recommendations. They are forwarded to you for information only, and are not for quotation in any public document or forum.

Sincerely yours,

Dr. W. E. Nervik
Radiochemistry Division Leader

WEN:sa

cc: T. McCraw
D. Wilson
W. Nervik/File

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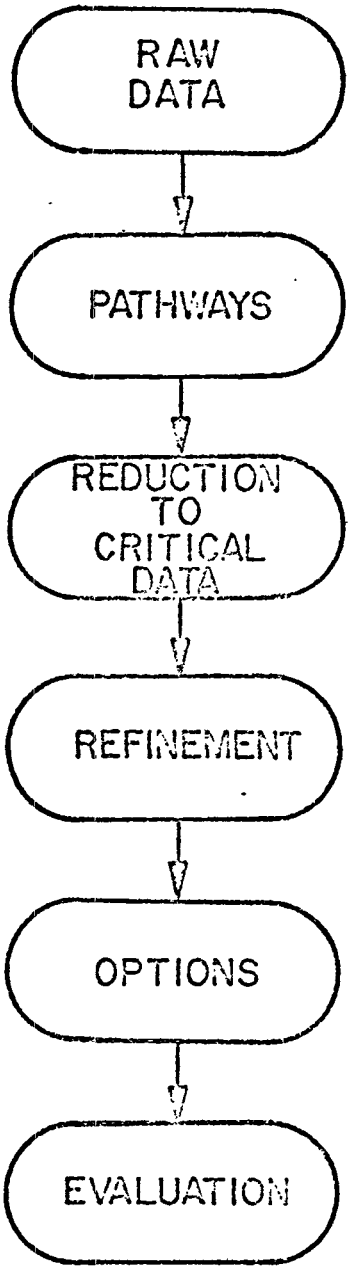
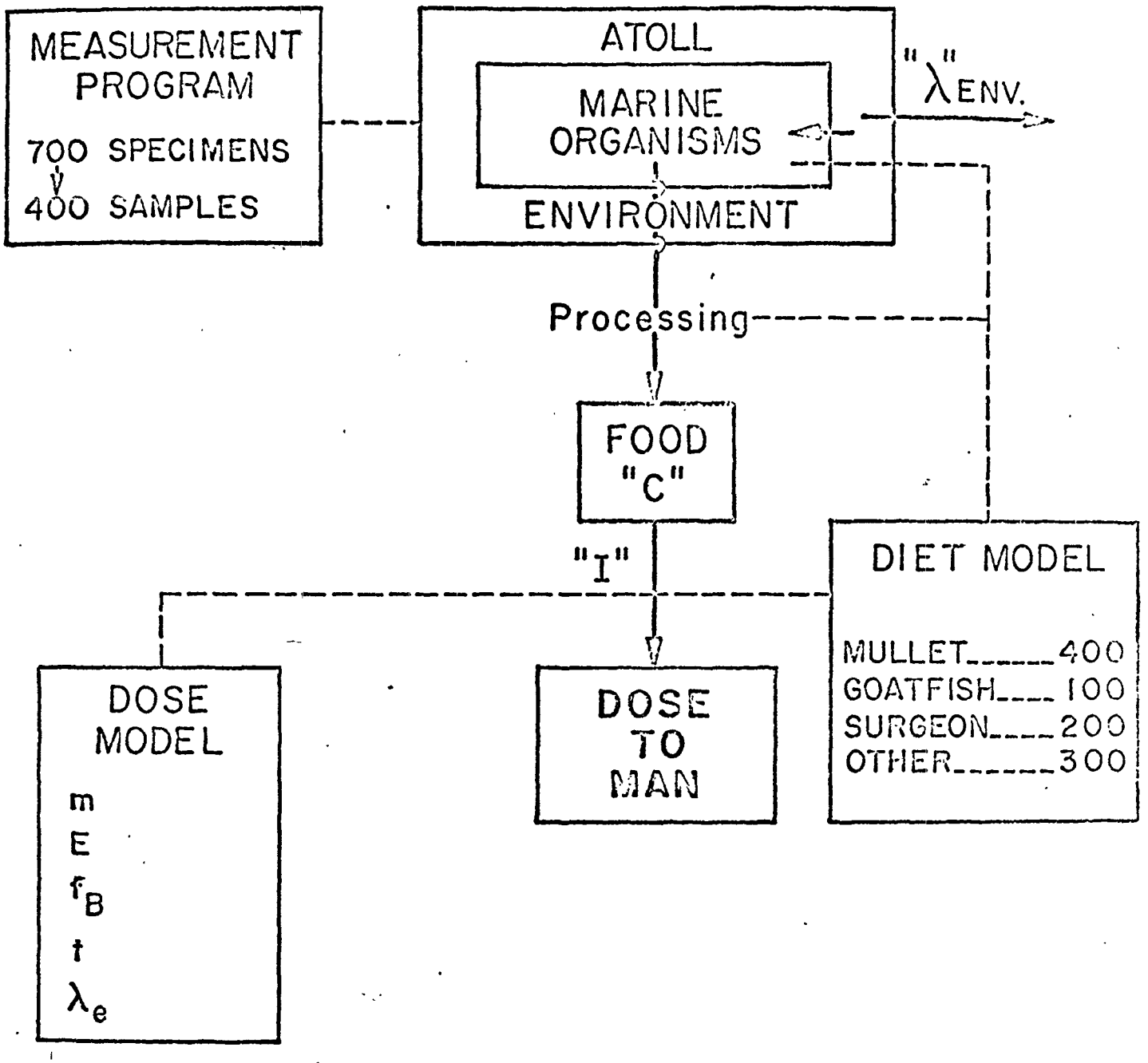


EVALUATION STEPS

MARINE FOOD CHAIN



2953

(USING DIET MODEL)

TOTAL ATOLL

- REM IN 30 YEARS -

	g/day	Co-60	Cs-137	Am-241	TOTAL
GOATFISH	100	0.036	0.009	0.002	0.047
SURGEON	200	0.027	0.088	0.004	0.119
OTHERS	300	0.081	0.072	0.008	0.161
MULLET	400	0.224	0.125	0.010	0.359
TOTAL	1,000	0.368	0.294	0.024	.686

EXCLUDING ALICE THRU IRENE

GOATFISH	100	0.014	0.005	0.003	0.022
SURGEON	200	0.013	0.016	0.004	0.033
OTHERS	300	0.041	0.035	0.008	0.084
MULLET	400	0.050	0.017	0.010	0.077
TOTAL	1,000	0.118	0.073	.025	0.216

2954

MREM IN 30 YRS FROM 1 GM/DAY INTAKE

TOTAL ATOLL	Cs-137	Co-60	Am-241	Total
MULLET (plankton feeder)	0.313	0.559	0.024	0.896
SURGEON (grazer)	0.441	0.135	0.021	0.597
GOATFISH (bottom feeder)	0.089	0.356	0.022	0.467
OTHERS (higher carnivores)	0.239	0.269	0.025	0.533

EXCLUDING ALICE THRU IRENE				
MULLET	0.042	0.124	0.024	0.190
SURGEON	0.082	0.064	0.019	0.165
GOATFISH	0.046	0.143	0.025	0.214
OTHERS	0.115	0.136	0.026	0.277

DOSE CONVERSION FACTORS

One gm/day intake, initial conc. of 1 pCi/g*, continued for 30 yrs, gives a whole body dose, during the 30 years, of:

nuclide	mrem
Co-60	0.148
Cs-137	0.473
Am-241	0.215

* concentration is time dependent due to radioactive decay only

2956

DOSE-TO-MAN COMPUTATION

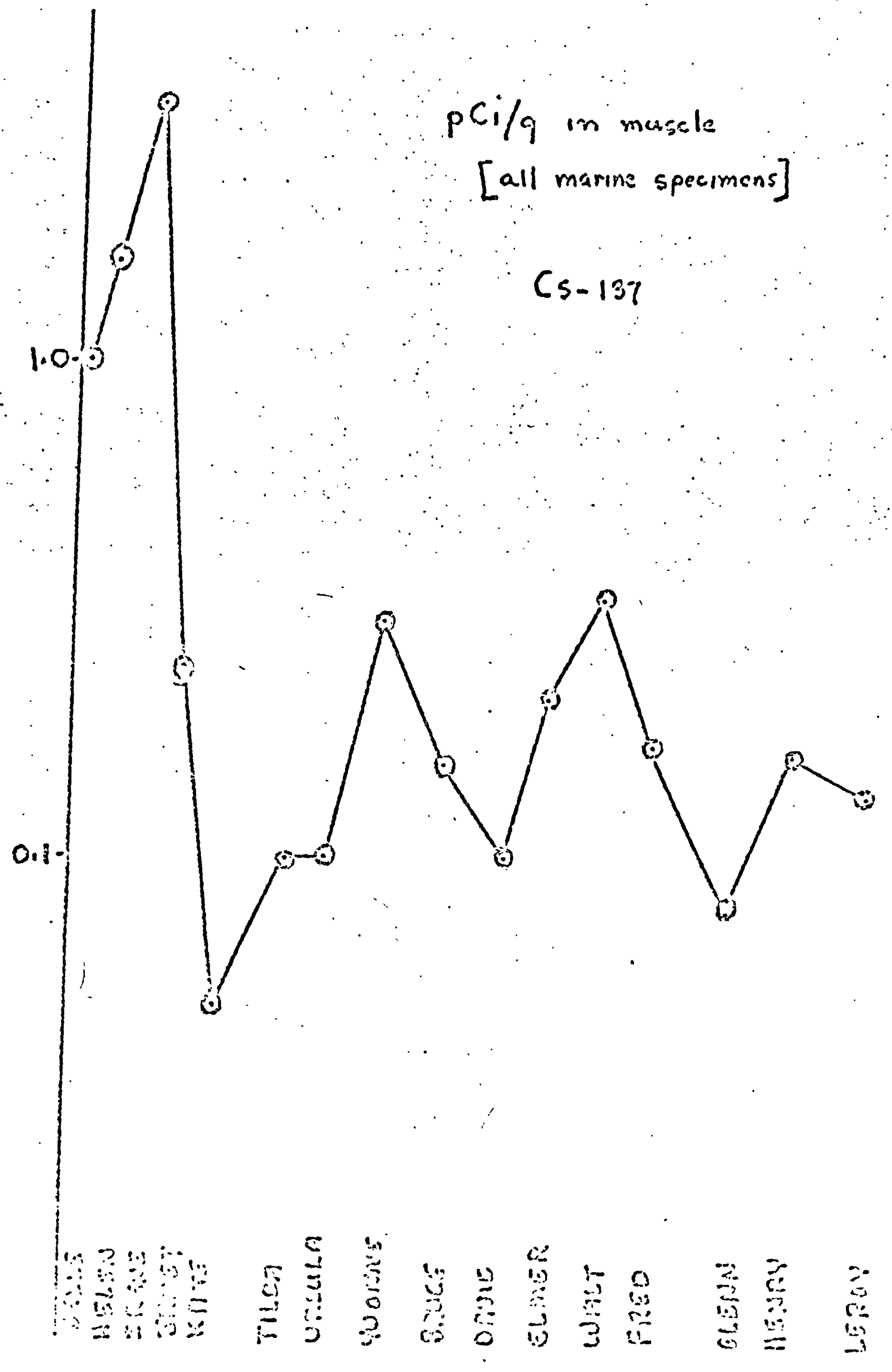
$$D/I \left(\frac{\text{mrem}}{\text{g/day}}\right) = \frac{k E f_M C'}{m(\lambda_e - \lambda_r)} \int_o^t \left(e^{-\lambda_r t} - e^{-\lambda_e t}\right) dt$$

parameter	definition	source
C', C	concentration, pCi/g, in organism and food, respectively	measurement program
$\lambda_{ENV.}$	effective environmental elimination constant, day^{-1}	radiological half-life
I	food intake rate, g/day	diet model
f_B	fraction of activity ingested which reaches organ of reference	ICRP publications, other literature
m	mass, g, of organ of reference	ICRP (standard man)
λ_e	effective elimination constant in the reference organ, day^{-1}	ICRP, other literature
E	effective absorbed energy per disintegration	ICRP

2957

REDUCTION TO EVALUATION LIST FOR MARINE FOOD-CHAIN

ACTIVITIES DETECTED IN FISH MUSCLE	DOSE SCAN	IN VIEW OF SOILS/SEDIMENTS	DOSE EVALUATION LIST
Co-60	X	X	Co-60
Ru-102			
Ru-106	X		
Sb-125			
Ba-133			
Cs-137	X	X	Cs-137
Ce-144			
Eu-152			
Eu-155			
Bi-207			
U-235			
Am-241	X	X	Am-241



pCi/g in muscle
[all marine specimens]
Cs-137
1.0
0.1
HELEN
TILDA
URSULA
YVONNE
BRUCE
ELMER
WALT
FRED
GLENN
HENRY
LEROY

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pCi/g in muscle
[all marine specimens]

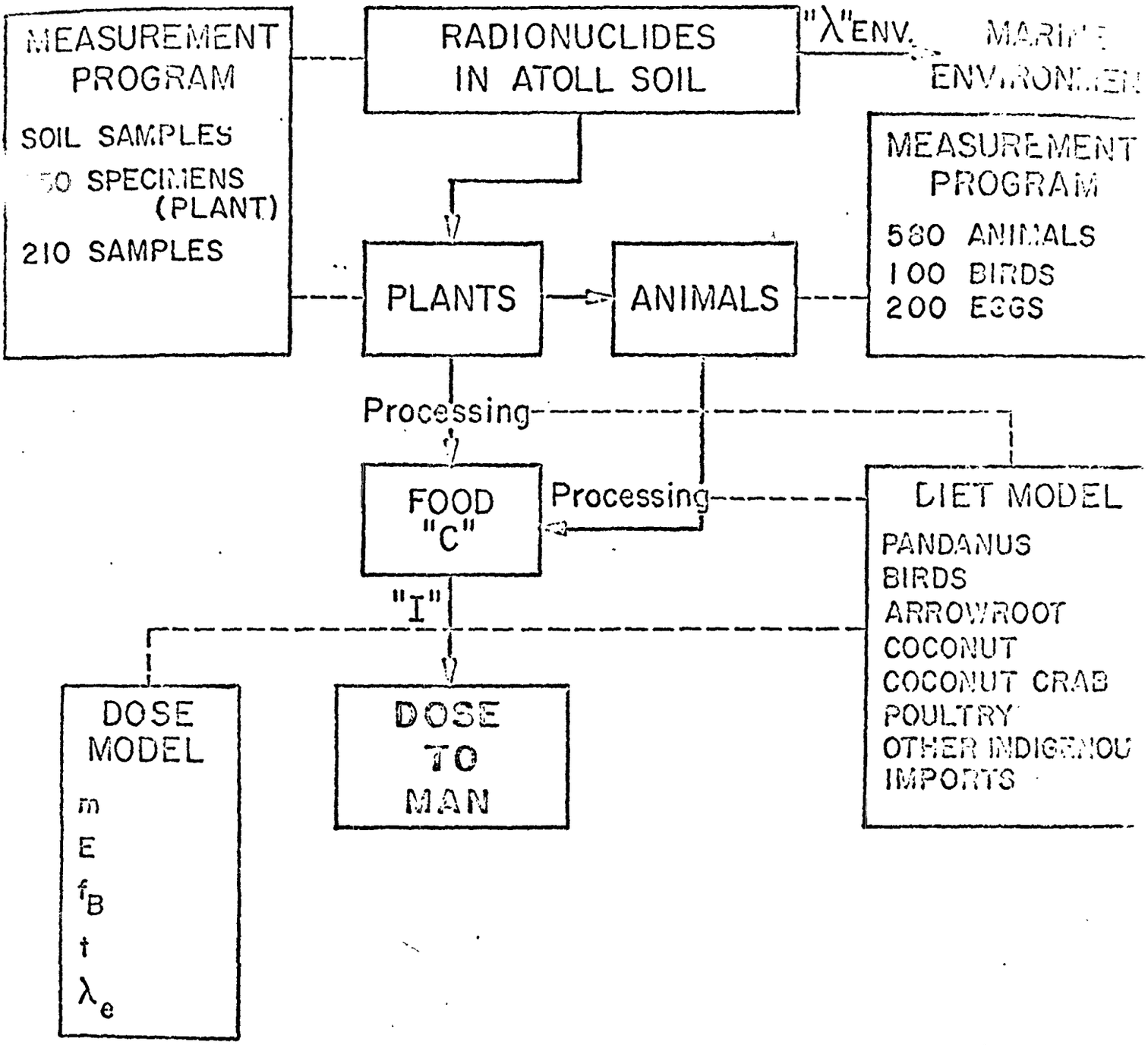
10
1
.1

Co-60
Am-241

DEAN
HELEN
IRENE
ROBERT
KATES
TILDA
URSULA
YOLANDE
BRUCE
DAVID
ELMER
WALT
FRED
GLENN
HENRY
LEROY

2900

TERRESTRIAL FOOD CHAIN



2961

Terrestrial Biota Sampling

Plant types taken:

Cocos, Guettarda, Messerschmidtia, Morinda, Pandanus, Pisonia, Scaveola, Tacca

Animal types taken:

Birds: common noddy, white capped noddy, fork tailed sandpiper, reef heron, sooty tern, tropic bird, noddy and tern eggs

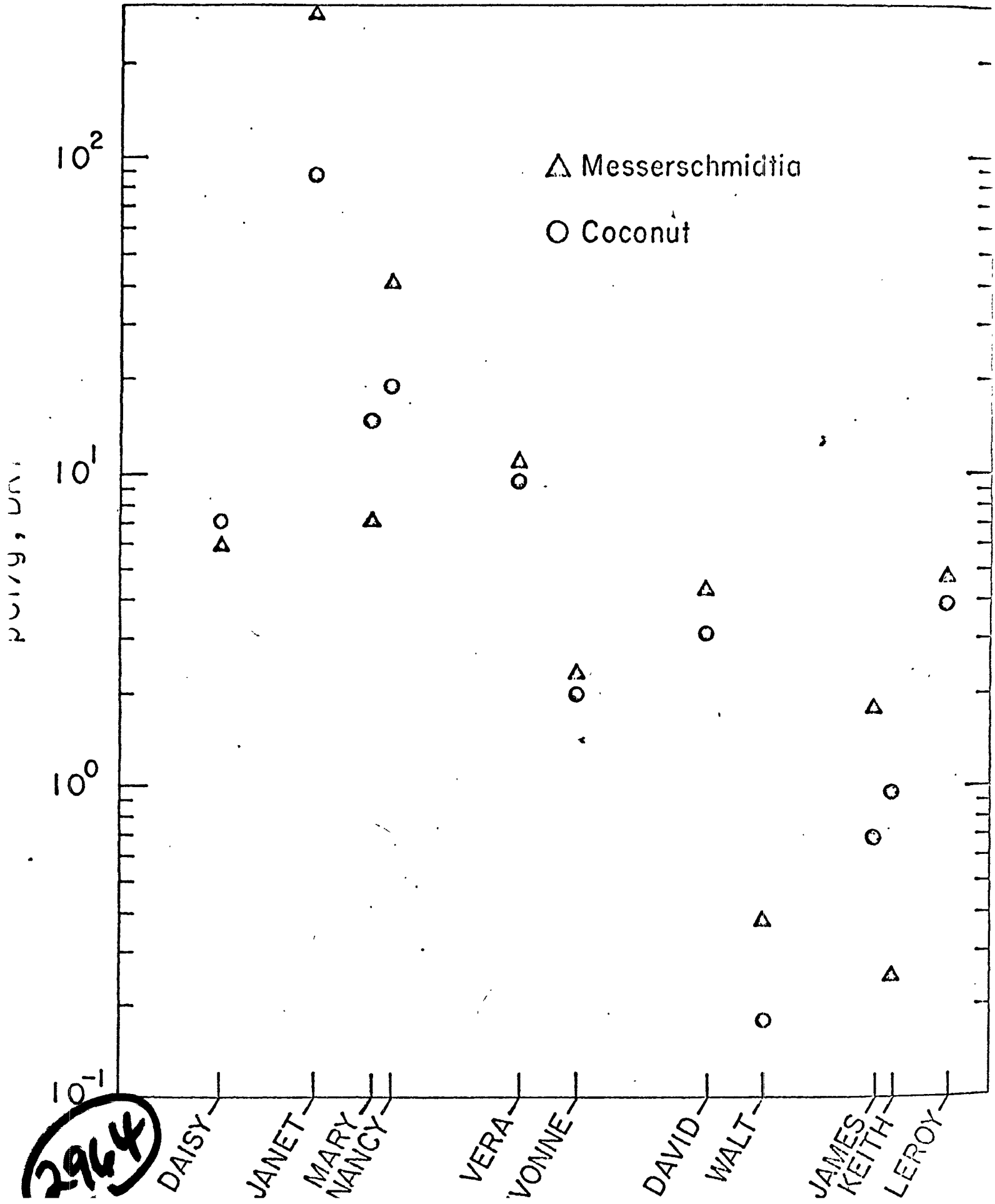
Rats: rice rat, roof rat

Crabs: coconut crab, hermit crab

EDIBLE PLANTS SAMPLED - TERRESTRIAL BIOTA SURVEY

Island	Coconut	Pandanus fruit	Morinda fruit	Tacca root
Alice		X		
Daisy	X			
Irene	X			
Janet	X			
Mary	X		X	
Nancy	X			
Olive			X	
Vera	X			
Yvonne	X			
David	X			X
Elmer	X			
Fred	X			
Glenn	X		X	
Henry	X		X	
Irwin	X			
James			X	
Keith	X	X		
Leroy	X		X	

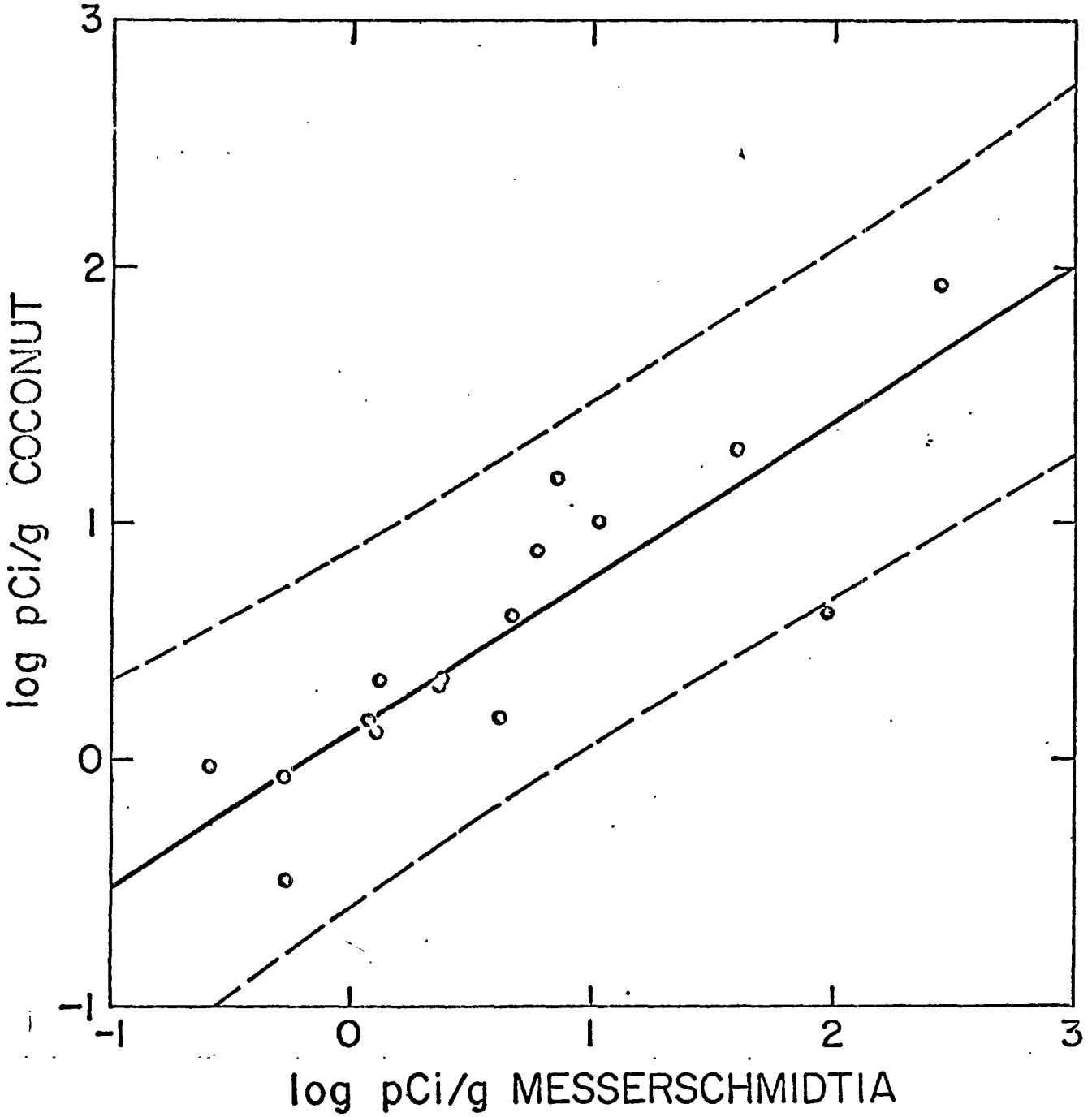
^{137}Cs IN VEGETATION BY ISLAND



2964

CORRELATION LOG-LOG BETWEEN ^{137}Cs IN COCONUT AND MESSERSCHMIDTIA _____...

log pCi/g Coconut = 0.12 + 0.63 log pCi/g Messerschmidtia



2965

CESIUM-137 IN EDIBLE PLANTS

		Coconut	Pandanus	Tacca
Keith	1972	0.95	0.86	
David	1972	1.50		8.96
Bikini	1964	12		27
Bikini	1967	114	52	92
Bikini	1969	50	110	0.65*

*Processed

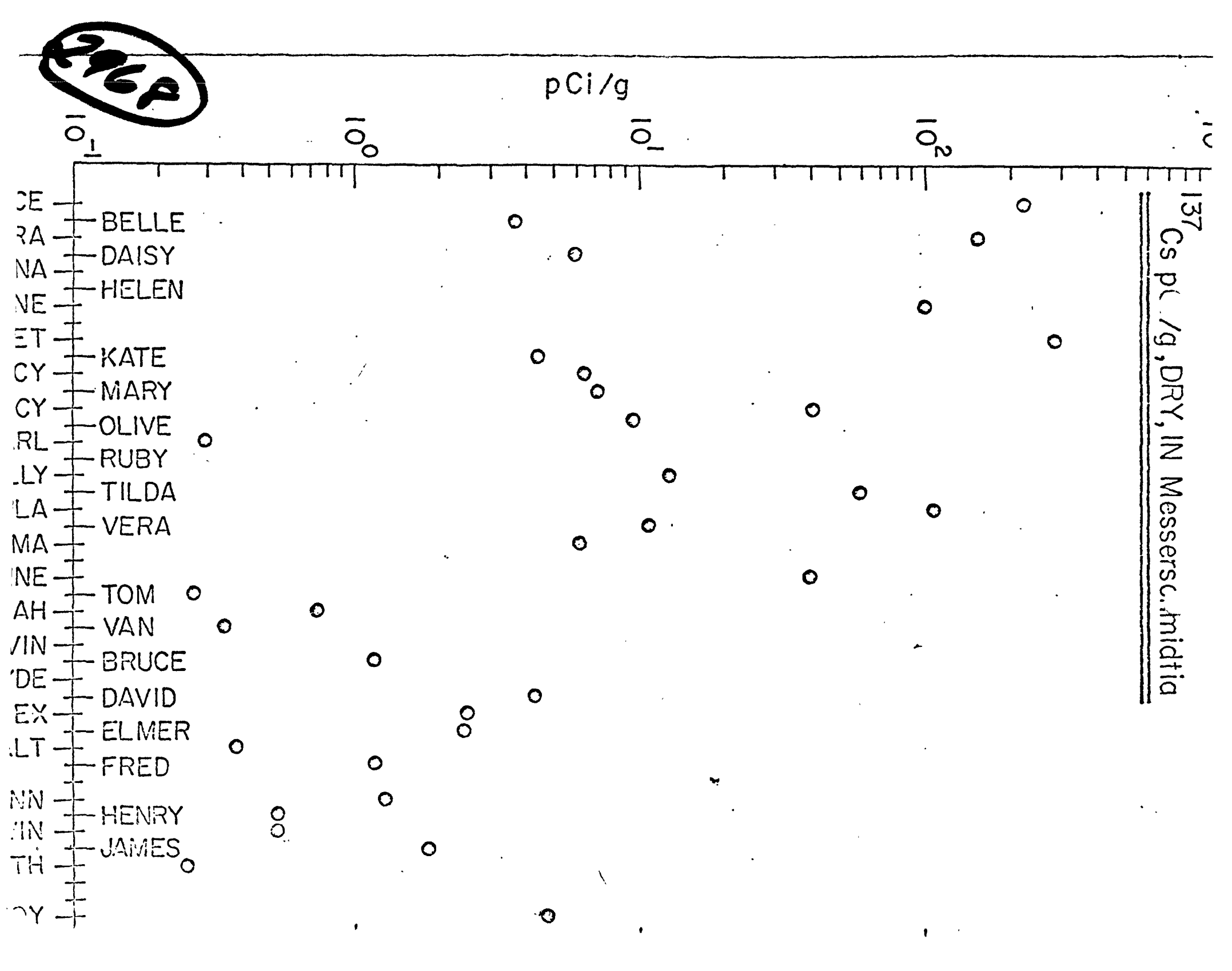
2966

CESIUM-137 IN EDIBLE PLANTS

		Coconut	Pandanus	Tacca
Keith	1972	0.95	0.86	
David	1972	1.50		8.96
Bikini	1964	12		27
Bikini	1967	114	52	92
Bikini	1969	50	110	0.65*

*Processed

2967


pCi/g
10^{1}
10^{0}
10^{-1}
10^{2}
BELLE
DAISY
HELEN
KATE
MARY
OLIVE
RUBY
TILDA
VERA
TOM
VAN
BRUCE
DAVID
ELMER
FRED
HENRY
JAMES
^{137}Cs pCi/g, DRY, IN Mesersc..midtia

AIR SAMPLER CHARACTERISTICS

FILTER MATERIAL: "Delbag" polystyrene Absolute filter (99.8% collection efficiency for .3μ).

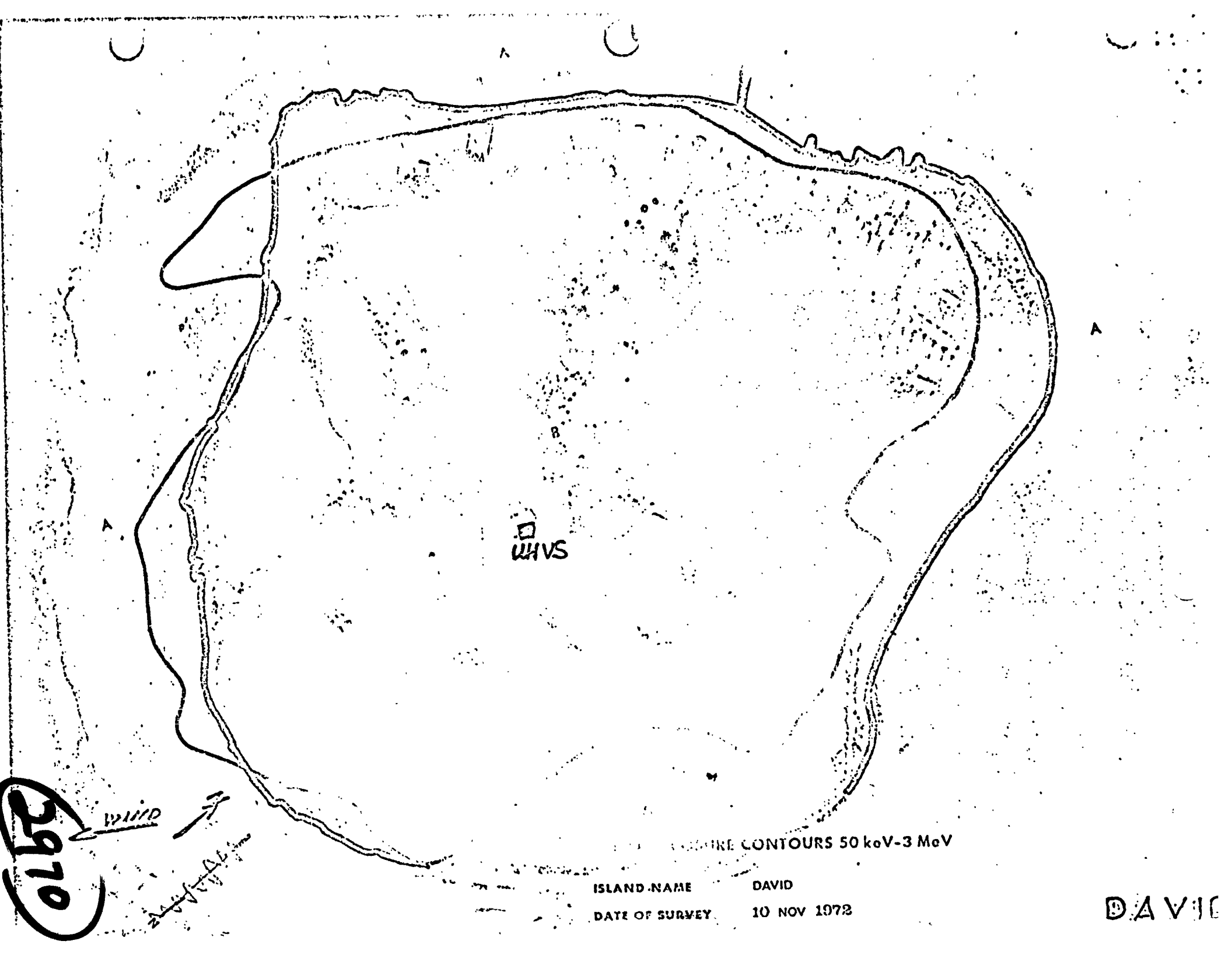
HIGH VOLUME: 2 units used simultaneously at two sites.
Q = 1800 m^3/hr.
Unattended endurance = 36 hrs.
Q total = 65,000 m^3.
Filter Area = 1.25 m^2.

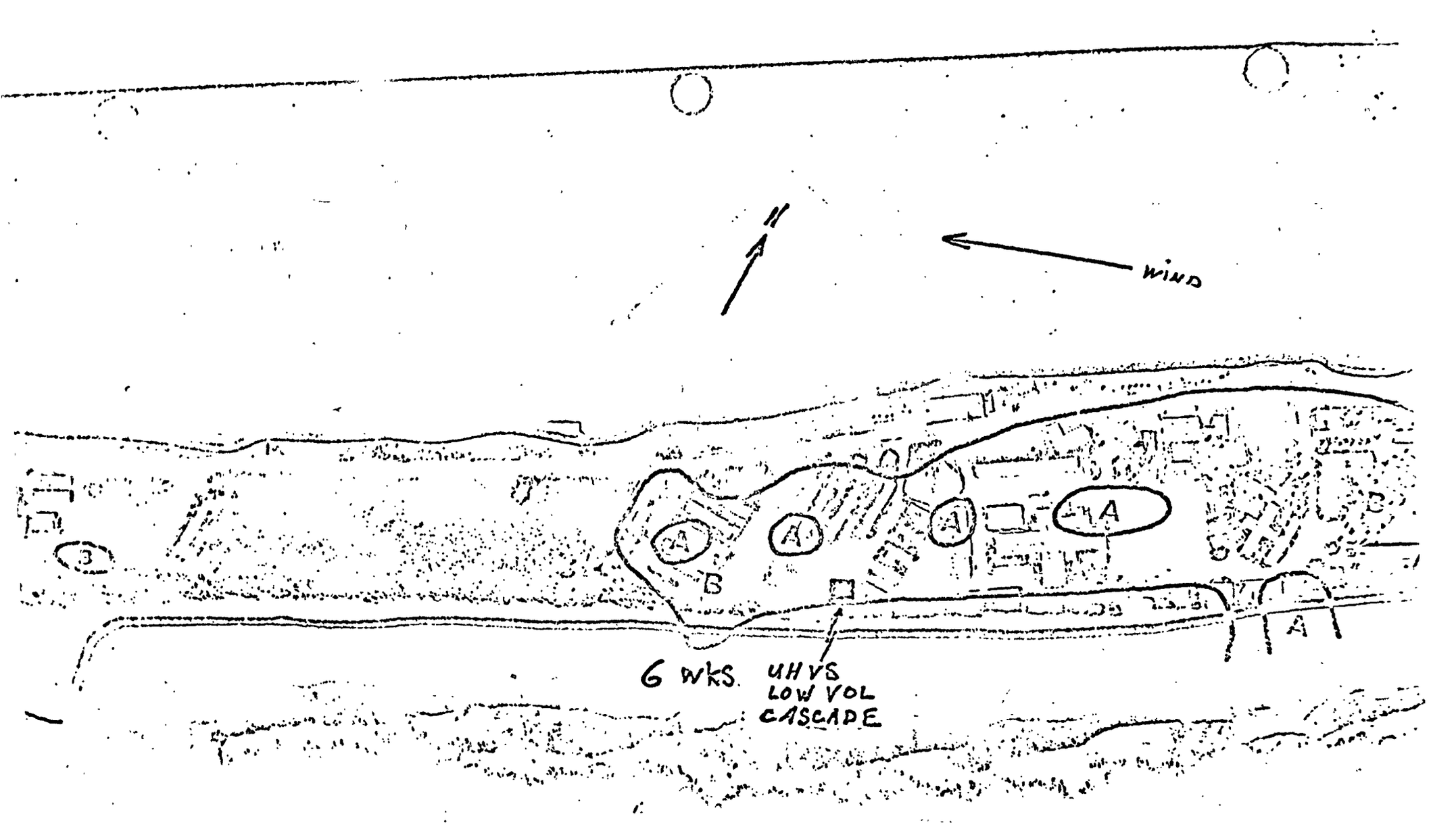
LOW VOLUME: 5 units: two site pairs; Palumbo Shipboard.
Q - 8 m^3/hr.
Unattended endurance = 5 days.
Q = 1000 m^3/5 days.
Filter Area = 0.032 m^2.

CASCADE IMPACTORS: 2 units used at two sites.
Q = 34 m^3/hr.
Unattended endurance = 5 days.
Q = 4100 m^3/5 days.
5 fiberglass filters each with particle separations: > 7μ; 3.3—7.0μ; 2.0—3.3μ; 1.1—2.0μ; .01—1.1μ.

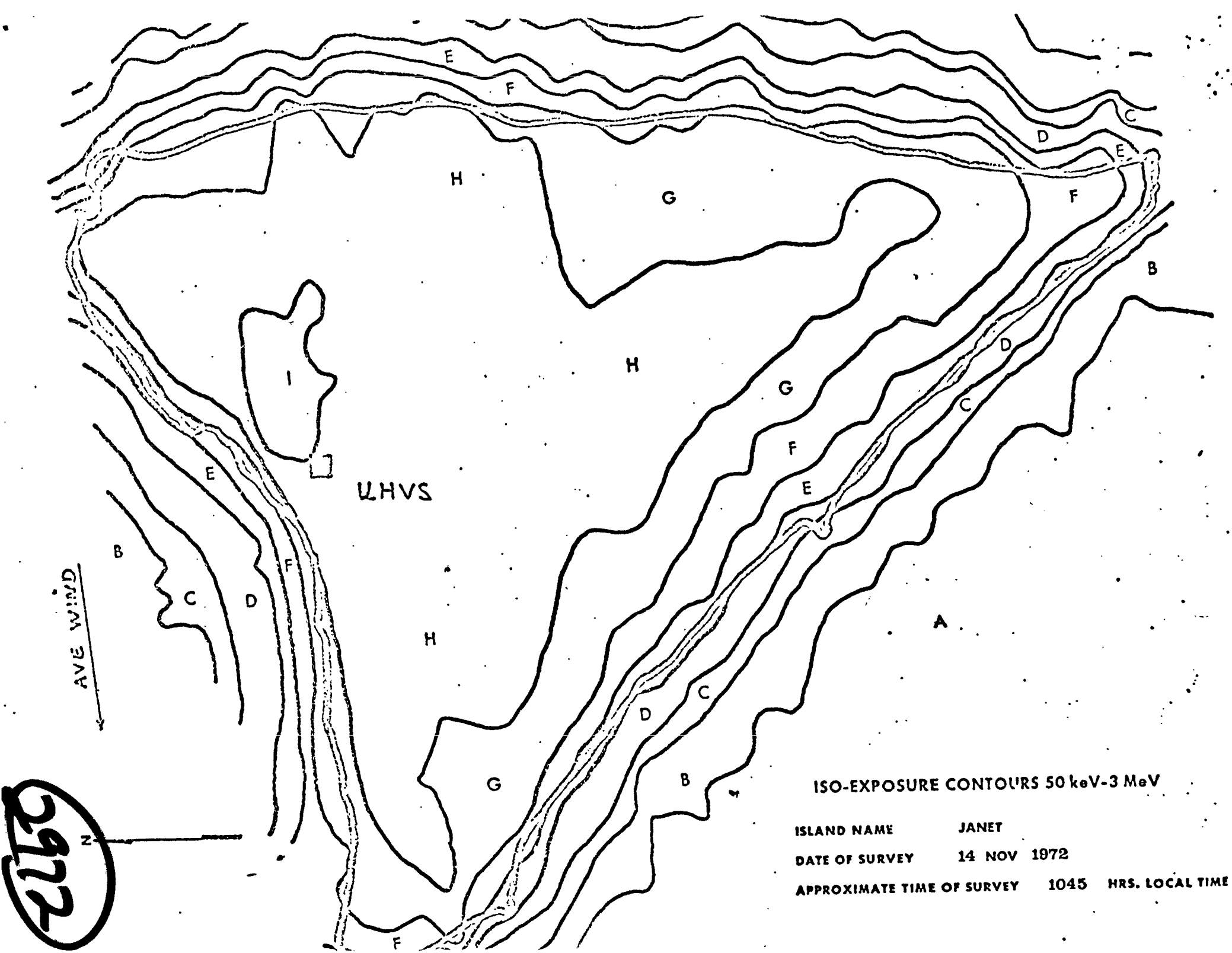
RECORDING WEATHER STATIONS: Portable station at Yvonne and Coast Guard at ENT.

2969


A
A
B
WHVS
WIND
IRE CONTOURS 50 keV-3 MeV
ISLAND NAME DAVID
DATE OF SURVEY 10 NOV 1972
DAVI



197



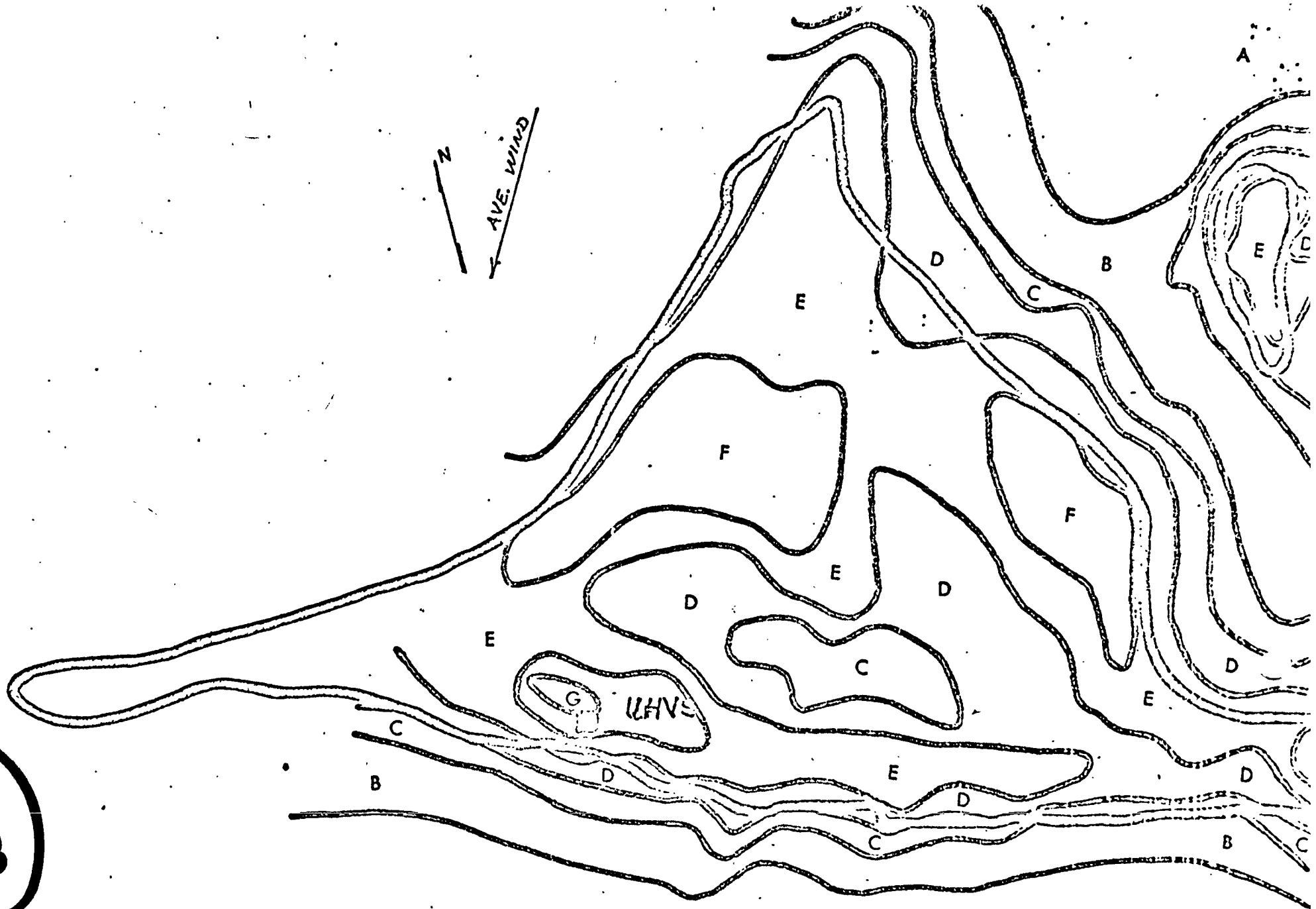
ISO-EXPOSURE CONTOURS 50 keV-3 MeV

ISLAND NAME JANET

DATE OF SURVEY 14 NOV 1972

APPROXIMATE TIME OF SURVEY 1045 HRS. LOCAL TIME

2172



ISO-EXPOSURE CONTOURS 50 keV-3 MeV

ISLAND NAME SALLY

DATE OF SURVEY 14 NOV 1972

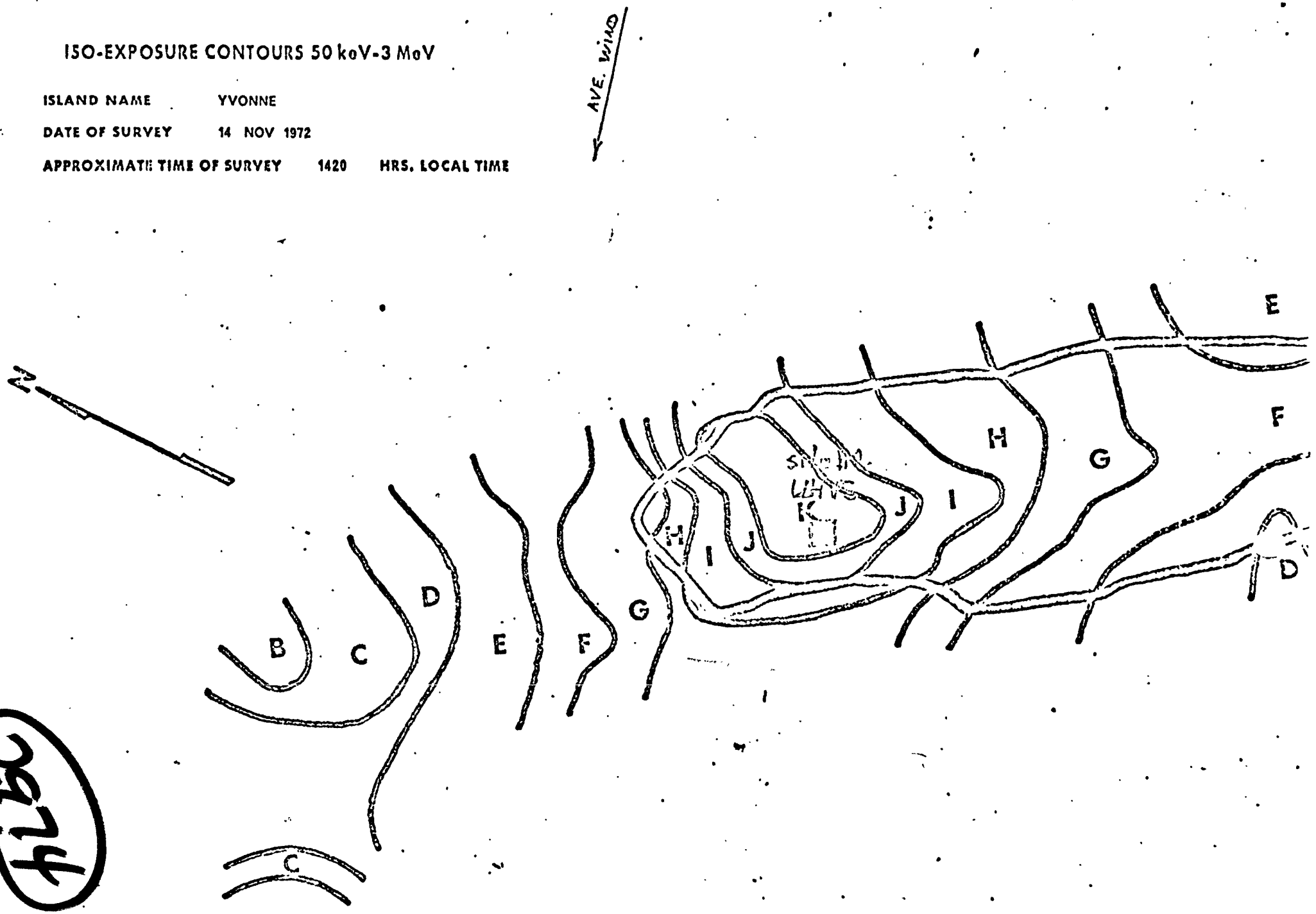
APPROXIMATE TIME OF SURVEY 1228 HRS. LOCAL TIME

ISO-EXPOSURE CONTOURS 50 keV-3 MeV

ISLAND NAME YVONNE

DATE OF SURVEY 14 NOV 1972

APPROXIMATE TIME OF SURVEY 1420 HRS. LOCAL TIME



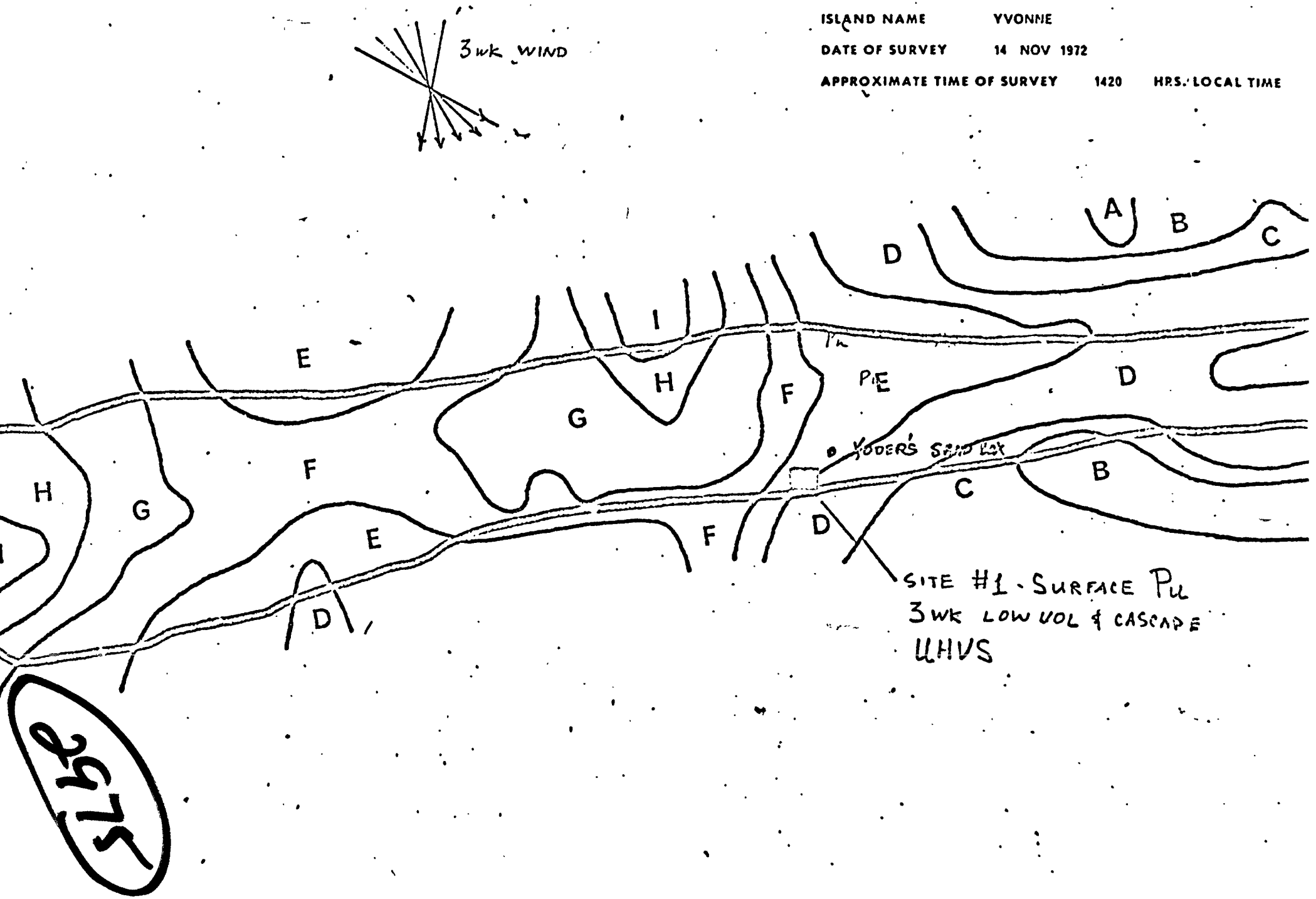
4130

ISO-EXPOSURE CONTOURS 50 keV-3 MeV

ISLAND NAME YVONNE

DATE OF SURVEY 14 NOV 1972

APPROXIMATE TIME OF SURVEY 1420 HRS. LOCAL TIME



978

Control Air Analysis

Sampler	Nuclide	Observed pCi/m³ @ 40,000 / 6000 m³	Livermore
UHVS blank	K^{40}	.011	—
	Pu^{239-40}	$(3.5)\ 10^{-5} \pm 4.8\%$	$(1.1-5.8)\ 10^{-5}$
	Pu^{238}	$< (.43)\ 10^{-5}$	$(5.1-42)\ 10^{-7}$
Low Vol & Cascade & Palumbo	Pu^{239-40}	$< (.54)\ 10^{-6}$	$(1.1-5.8)\ 10^{-5}$
	Pu^{238}	$< (.5)\ 10^{-6}$	$(5.1-42)\ 10^{-7}$
	Be^{7}	.03 - .19	.09 - .19
	Mn^{54}	$(3)\ 10^{-3}$	—
	Cs^{137}	$(9)\ 10^{-4}$	$(6-32)\ 10^{-4}$

4152

RADIONUCLIDES OBSERVED IN AIR (EXCEPT Y.S. YVONNE)

Nuclide	Observed Range pCi/m^3	At Livermore pCi/m^3	RCG pCi/m^3
Be^{7}	$< .004 - .18$	$.09 - .25$	$(4)10^{4}$
K^{40}	$< .004 - .010$		
Mn^{54}	$(< 5 - 1600)10^{-6}$		10^{4}
Zr^{95}	$(< .6 - 40)10^{-5}$	$(.49 - 44)10^{-5}$	10^{3}
Ru^{106}	$(< 8 - 300)10^{-4}$	$(1.4 - 40)10^{-4}$	200
Cs^{137}	$(< 1.7 - 41)10^{-4}$	$(6.3 - 32)10^{-4}$	500
Ce^{144}	$(< 8 - 51)10^{-4}$	$(2.4 - 31)10^{-4}$	200
Pu^{238}	$(< 8 - 43)10^{-7}$	$(5.1 - 42)10^{-7}$	1
$Pu^{238, 240}$	$(< .04 - 2.1)10^{-5}$	$(1.1 - 5.0)10^{-5}$	1

(27)

YVONNE AIR DATA

UHVS 34,000 m^3 16-17 Dec at Yoder's S.B. ENE 20-25 KN 0.03" rain.

Nuclide	Observed	At Livermore pCi/m^3
Be^7	0.193	.09-.25
Sb^{125}	$3.4(10^{14})$	$(4\text{-}23)10^{-4}$
Cs^{137}	$(8.2)10^{-4}$	$(6.3\text{-}32)10^{-4}$
Ce^{144}	$(86)10^{-4}$	$(2.4\text{-}31)10^{-4}$
Pu^{240}	$(2.65)10^{-3}$	$(1.1\text{-}5.8)10^{-5}$
Am^{241}	$(3.0)10^{-4}$	

81 78

YVONNE AIR DATA (Y'S SAND BOX)

UHVS 34,000 m^3 17-18 Dec ENE 22-24 KN 0.03" rain.

Nuclide	Observed	Remaining Atoll	Livermore	RCG
Be^7	.143	.011 - .18	.09 - .25	$(4)10^4$
Zr^{95}	$(40)10^{-5}$	$(.6 - 40)10^{-5}$	$(.49 - 44)10^{-5}$	10^3
Ru^{103}	$(2.4)10^{-4}$	0	$(2.9 - 340)10^{-4}$	$(3)10^3$
Sb^{125}	$(34)10^{-5}$	0	$(4 - 23)10^{-5}$	900
Ru^{106}	$(16)10^{-4}$	$(8 - 30)10^{-4}$	$(1.4 - 29)10^{-4}$	200
Cs^{137}	$(8.2)10^{-4}$	$(1.7 - 41)10^{-4}$	$(6.3 - 32)10^{-4}$	500
Ce^{144}	$(86)10^{-4}$	$(8 - 51)10^{-4}$	$(2.4 - 31)10^{-4}$	200
Pu^{239-40}	$(265)10^{-5}$	$(.04 - 2.1)10^{-5}$	$(1.1 - 5.8)10^{-5}$	1
Am^{242}	$(30)10^{-5}$	0	0	

Low Vol 3-9 Dec 3280 m^3 NE 0.91" rain.

Be^7	.14 - .19
Pu^{239}	$(4.1)10^{-4}$
Pu^{238}	$< (2.1)10^{-5}$

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YVONNE - CACTUS ENE 22-24 KM 0.01"

UHVS ~1,400 m^3 18-19 DEC

NUCLIDE	OBSERVED pCi/m^3	Remaining Atoll
Be^7	0.14	.011 - .136
K^{40}	0.025	.004 - .010

ENGEBI AIR DATA

TWO HAVS 4-9 DEC 72 80,000 m^3 E 8-15 KN 0.82" rain

NUCLIDE	OBSERVED	LIVERMORE pCi/m^3
Be^7	.004-.022	.09 - .25
Mn^{54}	$(1.6)\ 10^{-3}$	—
Cs^{137}	$(7.1-21)\ 10^{-4}$	$(6.3-32)\ 10^{-4}$
Pu^{239-40}	$(.58-1.8)10^{-5}$	$(1.1-5.8)\ 10^{-5}$

1862