2467

HAMILTON WATCH CO., INC.
LANCASTER, PENNSYLVANIA 17604 U.S.A. (717)394-7161

August 24, 1979

Mr. Nathan Bassin
Radioisotopes Licensing Branch
Div. of Fuel Cycle & Material Safety
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

REF: License #37-03572-07E

Dear Mr. Bassin:

Please find enclosed the Performance Classification Test per Self-Powered Lighting Test Specification AAC/HWCo-1177 for the following Hamilton Watch Company part number 97201:

HWCo. Case No.	Head No.	Module No.
97200	97201	2020

Very truly yours,

Olivier Barrelet
Manager, Research & Development

OB/bw
Enc: 2 copies

A/21

A. Test Procedures

At least five prototypes of each watch model will be subjected to the performance testing indicated below. Each watch shall undergo all the tests The tests shall be conducted in the order indicated below. Upon completion of each test, each watch shall be visually inspected for failure. In the absence of failure, the watch shall be subjected to the succeeding test. If there appears to be failure in any test, the watch shall be subjected to the immersion test indicated in A(6) for a positive indication of leakage before proceeding with the next test. Such watches shall also be subjected to the immersion test after completion of vibration testing. Failure of one or more of the prototypes to pass the testing and inspection requirement is cause for rejection of the watch model. Prototypes of the defective mod shall not be retested until the defect is corrected.

(1) Temperature Test

(a) Equipment. The heating and cooling equipment shall have a test zo volume of at least five times the volume of the test watch. The temperature of the test chamber shall be determined by at least tw recently calibrated temperature-measuring instruments, and the ave of the readings shall be taken as the true temperature. If a gas oil-fired furnace is used for the temperature test, an oxidizing a must be maintained at all times.

b. Procedure. All temperature tests shall be performed in air. Al prototype watches shall be held at or above 65 degrees Centigrad for at least one hour and at or below minus 30 degrees Centigrad for at least one hour. The test watches shall be allowed to re in the test chamber until they return to ambient conditions. W shall be raised from ambient temperature to 65 degrees Centigrad within a five minute period. Watches shall be cooled from ambie temperatures to minus 30 degrees Centigrade within 45 minutes.

(2) Thermal Shock Test

(a) Equipment. Same as A(1)(a)-Temperature Test

(b) Procedure. All prototype watches shall be heated to 65 degrees Centigrade or greater and held at this temperature for at least 15 minutes. The watch shall then be transferred in 15 seconds or less to the cold chamber held at or below minus 30 degrees Centigrade and remain there for at least 15 minutes.

(3) Reduced Pressure Test

(a) Equipment. The apparatus used for the pressure test shall consist of a vacuum pump vented to an exhaust system and a sealed chamber means for visual observation of the watch under test. The pressur gauge shall be calibrated within six months preceeding the test and should have a range at least 10 percent greater than the test pres

(b) Procedure. Prototype watches shall be placed in the chamber and exposed to a test pressure of 175 mm Hg (absolute) or less for four periods of 15 minutes each, the pressure being returned to atmospheric between each period.

(4) Impact Test

(a) Equipment. A rigid steel plate mounted on an unyielding surface and a support or shelf for watches.

(b) Procedure. The watch support shall be mounted one meter above the steel plate. Each prototype watch will be placed on a support and, using any device or means which will not have a tendency to orient t watch, pushed from the support and allowed to free fall and impact t steel plate in a random manner. The procedure shall be repeated 20 times. The support shall then be positioned two meters above the st plate. The watch shall be placed on the support and then pushed fro the support and allowed to impact the steel plate in a random manner The procedure shall be repeated twice.

(5) Vibration Test

(a) Equipment. The equipment shall be capable of providing a simple harmonic motion having an amplitude of 0.075 centimeter (0.03") and a maximum total excursion of 0.15 centimeter (0.06"), the frequency being varied uniformly between the approximate limits of 10 (hert. and 55 Hz.

(b) Procedure. Prototype watches shall be subjected to the above simple harmonic motion for 60 minutes. The entire frequency range, between 10 Hz and 55 Hz and return to 10 Hz, shall be traversed in approximately one minute.

(6) Immersion Test

(a) Equipment. Hot and cold baths.

(b) Procedure. Immerse each prototype watch in a water bath, maintained 0 degrees Centigrade, and allow it to remain for 15 minutes. The wat shall be transferred, within a one minute period, to a hot water bath maintained at or above 50 degrees Centigrade and allowed to remain for 15 minutes. Again, within one minute, the watch will be transferred to the cold bath and allowed to remain for 15 minutes. The cycle shall be repeated at least twice. The radioactivity in th hot and cold baths shall be determined. The total radioactivity in the liquids shall not exceed 50 nanocuries.

B. Inspection

The following procedures shall be used during the inspection of the prototype watches to determine compliance with the performance test requirements. Watches shall be evaluated to determine the ability of the watchcase and module design to maintain the integrity of the module and self-luminous source. At the end of the series of tests, the source must not be broken or punctured and remain fixed to the source pan,

D. Inspection (continued)

the source pan must remain secured in the watch module, and the watch module must remain secured in the watchcase. The tritium sources must not be accessible as a result of damage to either the watch module or the liquid crystal display.

(1) The test watches shall be examined visually for any evidence of failure. Each watch shall be disassembled to verify that all components remain secured in the watchcase and within the module.

(2) Each watch shall be individually soak tested for 24 hours in a volume of water equal to 10 times the volume of the watch. The watch shall be removed and the tritium activity in the water solution determined. The total activity in the water solution shall not exceed 50 nanocuries for each tritium light source in the watch, or 100 nanocuries per watch, whichever is less.

C. Marking

Watchcases shall be permanently marked to indicate the presence of tritium as authorized by specific amendment to this license. Watches shall also be permanently marked to identify the manufacturer.

SELF-POWERED LIGHTING LIMITED
8 WESTCHESTER PLAZA ELMSFORD NY 10523

LABORATORY REPORT
SPL TEST SPECIFICATION 1732
JOB NUMBER 2221
DATE 6/15/79

TEST DESCRIPTION	VISUAL EXAM	RADIATION SOAK TEST	REMARKS
3.1.2 Temperature	OK		
3.1.3 Thermal Shock	OK		
3.1.4 Pressure (Reduced)	OK		
3.1.5 Impact (Level 2)	-		
3.1.6 Impact (Level 4)	OK		
3.1.7 Vibration	OK		
3.1.8 Immersion (Hot/Cold Bath)	OK	See attached Report No.	

SAMPLE NO.	INITIAL BRIGHTNESS	BRIGHTNESS AFTER TEST
97201 16-24	25	25
	20	20
	20	20
	20	20
	25	25

REMARKS & CONCLUSIONS

Technician [signature] Date 6/15/79

TEL. 914 592 8230 • TELEX 13[illegible]79

REPORT NO. _____

DATE 8/10/79 TEST IMMERSION

SAMPLE P/N 9722C1 JOB NO./CUSTOMER 2221 – Ham, Ken

TEST SOAK TIME (t) .25 HRS.

ACTUAL SOAK TIME (t_A) .25 HRS.

SOAK WATER VOLUME (V) 200 MLS.

MAXIMUM TRITIUM ALLOWABLE (T) .05 microcuries

MACHINE EFFICIENCY (E) 25

BACKGROUND (B) COLD 694 HOT 358 CPM

Test sample, 0.1 cc Counting time; 1 min.

SAMPLE NO.	SAMPLE QTY	TEST CPM	TRITIUM REMOVED μCi	INSPECTOR INITIAL
COLD	5	< Bkg	– 0 –	
HOT	5	< Bkg	– 0 –	

COLD

1 0 1
4 6 9
4 7 9
4 0 9

HOT

1 0 0
1 7 9
1 8 6
1 7 8

[illegible]

REPORT NO.___

DATE 8/14/79 TEST 24 HOUR SOAK

SAMPLE P/N 97201 JOB NO./CUSTOMER ___

TEST SOAK TIME (t) 24 HRS.

ACTUAL SOAK TIME (t_A) 24 HRS.

SOAK WATER VOLUME (V) 50 MLS.

MAXIMUM TRITIUM ALLOWABLE (T) .100 microcuries

MACHINE EFFICIENCY (E) .25

BACKGROUND (B) ___ CPM

Test sample; 0.1 cc Counting time; 1 min.

SAMPLE NO.	SAMPLE QTY	TEST CPM	TRITIUM REMOVED µCi	INSPECTOR INITIAL
16	1	< Bkg	0	[signature]
17	1	< Bkg	0	
18	1	< Bkg	0	
19	1	< Bkg	0	
20	1	< Bkg	0	

16	100	352	374	352
17	100	330	349	328
18	100	292	314	294
19	100	248	260	248
20	100	298	315	297

SELF-POWERED LIGHTING LIMITED
8 WESTCHESTER PLAZA ELMSFORD NY 10523

LABORATORY REPORT
SPL TEST SPECIFICATION 1732
JOB NUMBER 2221
DATE 8/15/79

TEST DESCRIPTION	VISUAL EXAM	RADIATION SOAK TEST	REMARKS
3.1.2 Temperature	OK		
3.1.3 Thermal Shock	OK		
3.1.4 Pressure (Reduced)	OK		
3.1.5 Impact (Level 2)			
3.1.6 Impact (Level 4)	OK		
3.1.7 Vibration	OK		
3.1.8 Immersion (Hot/Cold Bath)	OK	See attached Report No. ___	

SAMPLE NO.	INITIAL BRIGHTNESS	BRIGHTNESS AFTER TEST
97201 16-20	25	25
	20	20
	20	20
	20	20
	25	25

REMARKS & CONCLUSIONS

Technician [signature] Date 8/15/79

T ..914 592 8230 • TELE 131639

REPORT NO. _ _

DATE 8/10/79 TLST IMMERSION

SAMPLE P/N 97201 JOB NO./CUSTOMER 2221 – Hamilton

TEST SOAK TIME (t) .25 HRS.

ACTUAL SOAK TIME (t_A) .25 HRS.

SOAK WATER VOLUME (V) 200 MLS.

MAXIMUM TRITIUM ALLOWABLE (T) .05 microcuries

MACHINE EFFICIENCY (E) 25

BACKGROUND (B) COLD 194 HOT 358 CPM

Test Sample: 0.1 cc Counting time; 1 min.

SAMPLE NO.	SAMPLE QTY	TEST CPM	TRITIUM REMOVED μCi	INSPECTOR INITIAL
COLD	5	< Bkg	– 0 –	
HOT	5	< Bkg	– 0 –	

COLD

1 0 0
4 6 9
4 7 9
4 6 9

HOT

1 0 0
1 7 9
1 8 6
1 7 8

SPL SELF POWERED LIGHTING LIMITED
8 WESTCHESTER PLAZA, ELMSFORD, NY 10523

REPORT NO. ____

DATE 8/14/79 TEST 24 HOUR SOAK

SAMPLE P/N 97201 JOB NO./CUSTOMER ____

TEST SOAK TIME (t) 24 HRS.

ACTUAL SOAK TIME (t_A) 24 HRS.

SOAK WATER VOLUME (V) 50 MLS.

MAXIMUM TRITIUM ALLOWABLE (T) .100 microcuries

MACHINE EFFICIENCY (E) .25

BACKGROUND (B) ____ CPM

Test sample; 0.1 cc Counting time; 1 min.

SAMPLE NO.	SAMPLE QTY	TEST CPM	TRITIUM REMOVED µCi	INSPECTOR INITIAL
16	1	< Bkg	0	[initials]
17	1	< Bkg	0	
18	1	< Bkg	0	
19	1	< Bkg	0	
20	1	< Bkg	0	

60242 70098 80244 90808 00857
10575 10342 10313 10464 20319
1333 1333 1232 1222 1232

0804

AMERICAN ATOMICS CORPORATION

425 SOUTH PLUMER AVE., TUCSON, ARIZONA 85719

602 ANA
AREA CODE 602

March 1, 1979

Hamilton Watch Company
P.O. Box 420
945 Wheatland Avenue
Lancaster, PA 17604

ATT: Mr. Olivier Barrelet
Manager of Research and Development

Gentlemen:

This is to amend the statement on American Atomics Corporation test report dated November 27, 1978 indicating that the watch model under test contained two gaseous tritium light sources (GTLS's).

Information received from Hamilton Watch Company on February 27, 1979 indicates the referenced watches each contained three GTLS's, identified as follows:

Manufacturer: Merz & Benteli Nuklear AG, Bern, Switzerland
Model Number: T-4001-1
Length: 18.5 millimeters
Width: 2.35 millimeters
Thickness: 0.7 millimeters
Wall Thickness: 0.2 millimeters
Material: Borosilicate glass
Maximum Tritium Content Per Tube: 67 millicuries
Maximum Tritium Content Per Watch: 200 millicuries

Sincerely,

AMERICAN ATOMICS CORPORATION

J. T. Miller
Quality Assurance Supervisor

JTM:mah

A1:8

AMERICAN ATOMICS