Certificate of Analysis - Amended

Product Description	WA07 Distribution Lot	
Cell Line Provider	WiCell Research Institute	
Parent Material	WA07-MCB-04	
Lot Number	WA07-DL-03	
Date Vialed	23-March-2009	
Passage Number	P30	
Culture Platform	Feeder dependent – MEFs	
	Media: hES Medium	Matrix: MEFs

The following testing specifications have been met for the specified product lot:

Test Description	Test Provider	Test Method	Test Specification	Result
Post-Thaw Viable Cell Recovery	WiCell	SOP-CH-305	≥ 15 Undifferentiated Colonies, ≤ 30% Differentiation	Pass
Identity by STR	UW Molecular Diagnostics Laboratory	PowerPlex 1.2 System by Promega	Positive identity[1]	Pass
Sterility - Direct transfer method	Apptec	30744	No contamination detected	Pass
Mycoplasma	Bionique	M250	No contamination detected	Pass
Karyotype by G-banding	WiCell	SOP-CH-003	Normal karyotype	Pass
Flow Cytometry for ESC Marker Expression	UW Flow Cytometry Laboratory	SOP-CH-101 SOP-CH-102 SOP-CH-103 SOP-CH-105	Report - no specification	See report

[1] An anomalous band pattern has been observed in this WA07 cell lot. See additional information regarding similar anomalies at: "A Genetic Basis for Anomalous Band Patterns Encountered During DNA STR Profiling", Clayton, T.M., et al. J. Forensic Sci, Nov. 2004, Vol. 49, No. 6. The STR anomalies were verified by 2 independent laboratories. Based on results from the standard G-band analysis, the karyotype of the cell line appears normal at the corresponding STR location.

Distribution Lot cells are expanded from vials of Master Cell Bank (MCB) cells. MCB cells are thoroughly tested and known to be free of many viruses and pathogens. These cells have undergone extensive testing and are not known to harbor any human pathogens or adventious agents of murine, bovine, or porcine origin. Cells distributed by WiCell are intended for research purposes only and are not intended for use in humans.

Appropriate biosafety precautions should be followed when working with these cells. The end user is responsible for ensuring that the cells are handled and stored in an appropriate manner. WiCell is not responsible for damages or injuries that may result from the use of these cells.

Please contact technical service via the website to request test methods and other assistance with your cells. The knowledgeable technical support staff can assist with cell culture concerns, training, and any other customer service concerns.

Amendment(s):

Reason for Amendment	Date
CoA updated to include copyright information.	See signature
CoA updated to correct testing provider and methods.	07-SEP-2010
CoA updated for format changes, clarification of test specifications, test method, addition of test provider, culture platform, and electronic signature, and reference to WiCell instead of the NSCB	05-AUG-2010
Original CoA	12-NOV-09

Date of Lot Release	Quality Assurance Approval
12-November-2009	1/3/2014 X AMC AMC Quality Assurance Signed by: [redacted]

UW Health

University of Wisconsin
Hospital and Clinics

Histocompatibility/Molecular Diagnostics Laboratory

Short Tandem Repeat Analysis*

Sample Report: 7181-STR | UW HLA#: 60888 | Sample Date: 05/08/09 Received Date: 05/08/09

Requestor: WiCell Research Institute

Test Date: 05/11/09 | File Name: 090512 | Report Date: 05/13/09

Sample Name: (label on tube)
7181-STR

Description: DNA Extracted by WiCell

252.59 ug/mL; 260/280 = 1.9

Locus	Repeat #	STR Genotype
D16S539	5, 8-15	12,13
D7S820	6-14	10,11
D13S317	7-15	11,12,13
D5S818	7-15	11,13
CSF1PO	6-15	12,12
TPOX	6-13	8,11
Amelogenin	NA	X,X
TH01	5-11	6,6
vWA	11, 13-21	14,15

Comments: Based on the 7181-STR DNA submitted by WI Cell dated 05/08/09 and received on 05/08/09, this sample (UW HLA# 60888) generally matches the STR profile of the human stem cell line H7 comprising 14 allelic polymorphisms across the 8 STR loci analyzed. However, at the D13S317 loci, the 7181-STR DNA sample displays a strong amplification of an additional 13 allele. Other than this anomaly, no STR polymorphisms other than those corresponding to the human H7 stem cell line were detected and the concentration of DNA required to achieve an acceptable STR genotype (signal/ noise) was equivalent to that required for the standard procedure (~1 ng/amplification reaction) from human genomic DNA. These results suggest that the 7181-STR DNA sample submitted corresponds to the H7 stem cell line and while it does not appear to be contaminated with any other human stem cells or a significant amount of mouse feeder layer cells, this H7 cell line may be exhibiting some instability as noted by the unique findings at the D13S317 loci. Sensitivity limits for detection of STR polymorphisms unique to either this or other human stem cell lines is ~5%.

HLA/Molecular Diagnostics Laboratory

HLA/Molecular Diagnostics Laboratory

* Testing to assess engraftment following bone marrow transplantation was accomplished by analysis of human genetic polymorphisms at STR loci. This methodology has not yet been approved by the FDA and is for investigational use only.

File: Final STR Report

WuXi AppTec

WiCell Research Institute

April 23, 2009
P.O. #:

STERILITY TEST REPORT

Sample Information: hES Cells
3: WA07-DL-3, #2977

Date Received: April 07, 2009
Date in Test: April 08, 2009
Date Completed: April 22, 2009

Test Information: Test Codes: 30744, 30744A
Immersion, USP / 21 CFR 610.12
Procedure #: BS210WCR.201

TEST PARAMETERS	PRODUCT	
Approximate Volume Tested	0.5 mL	0.5 mL
Number Tested	2	2
Type of Media	SCD	FTM
Media Volume	400 mL	400 mL
Incubation Period	14 Days	14 Days
Incubation Temperature	20 °C to 25 °C	30 °C to 35 °C
RESULTS	2 NEGATIVE	2 NEGATIVE

Page 1 Signed
QA Reviewer **Date**

Page 1 Signed
Technical Reviewer **Date**

Mycoplasma Testing Services

BIONIQUE TESTING LABORATORIES, INC.

Document#: DCF3013D
Edition#: 10
Effective Date: 07/15/2003
Title: **M-250 FINAL REPORT SHEET**

M-250 FINAL REPORT

Direct Specimen Culture
Procedure 3008, 3011, 3013

TO: Wicell QA

BTL SAMPLE ID#: **57291** P.O.#: DATE REC'D: **05/05/2009**

TEST/CONTROL ARTICLE:

WA07-DL-3-S1 Code 7181

LOT#: **NA**

DIRECT CULTURE SET-UP (DAY 0) DATE: **05/06/2009**

INDICATOR CELL LINE (VERO) SEE DNA FLUOROCHROME RECORD SHEET

			DATE
THIOGLYCOLLATE BROTH	DAY 7	+ ⊖	05/13/2009
	DAY 28	+ ⊖	06/03/2009
BROTH-FORTIFIED COMMERCIAL			
0.5 mL SAMPLE	DAY 7	+ ⊖	05/13/2009
6.0 mL BROTH	DAY 28	+ ⊖	06/03/2009
BROTH-MODIFIED HAYFLICK			
0.5 mL SAMPLE	DAY 7	+ ⊖	05/13/2009
6.0 mL BROTH	DAY 28	+ ⊖	06/03/2009
BROTH-HEART INFUSION			
0.5 mL SAMPLE	DAY 7	+ ⊖	05/13/2009
6.0 mL BROTH	DAY 28	+ ⊖	06/03/2009

(See Reverse)

Document#: DCF3013D
Edition#: 10
Effective Date: 07/15/2003
Title: M-250 FINAL REPORT SHEET

SAMPLE ID#: 57291		AEROBIC	MICROAEROPHILIC	DATE
AGAR PLATES-FORTIFIED COMMERCIAL	DAY 7	+ ⊖	+ ⊖	05/13/2009
	DAY 14	+ ⊖	+ ⊖	05/20/2009
	DAY 21	+ ⊖	+ ⊖	05/27/2009
AGAR PLATES-MODIFIED HAYFLICK	DAY 7	+ ⊖	+ ⊖	05/13/2009
	DAY 14	+ ⊖	+ ⊖	05/20/2009
	DAY 21	+ ⊖	+ ⊖	05/27/2009
AGAR PLATES-HEART INFUSION	DAY 7	+ ⊖	+ ⊖	05/13/2009
	DAY 14	+ ⊖	+ ⊖	05/20/2009
	DAY 21	+ ⊖	+ ⊖	05/27/2009
BROTH SUBCULTURES (DAY 7)		DATE: 05/13/2009		
AGAR PLATES-FORTIFIED COMMERCIAL	DAY 7	+ ⊖	+ ⊖	05/20/2009
	DAY 14	+ ⊖	+ ⊖	05/27/2009
	DAY 21	+ ⊖	+ ⊖	06/03/2009
AGAR PLATES-MODIFIED HAYFLICK	DAY 7	+ ⊖	+ ⊖	05/20/2009
	DAY 14	+ ⊖	+ ⊖	05/27/2009
	DAY 21	+ ⊖	+ ⊖	06/03/2009
AGAR PLATES-HEART INFUSION	DAY 7	+ ⊖	+ ⊖	05/20/2009
	DAY 14	+ ⊖	+ ⊖	05/27/2009
	DAY 21	+ ⊖	+ ⊖	06/03/2009

RESULTS: No detectable mycoplasmal contamination

6-3-09
Date

M-250 Procedural Summary: The objective of this test is to ascertain whether or not detectable mycoplasmas are present in an in vitro cell culture sample, be it a primary culture, hybridoma, master seed stock or cell line. This procedure combines an indirect DNA staining approach to detect non-cultivable mycoplasmas with a direct culture methodology utilizing three different mycoplasmal media formulations. The indirect approach involves the inoculation of the sample into a mycoplasma-free VERO (ATCC) indicator cell line and performing a DNA fluorochrome assay after 72-120 hours of incubation. The direct culture aspect of the test utilizes three different mycoplasmal media including both broth and agar formulations. The sample is inoculated into each of the 3 broth formulations and also onto duplicate plates (0.1 mL/plate) for each of the 3 agar formulations. Subculture from broth to fresh agar plates is carried out after 7 days incubation. Agar plates are incubated aerobically and microaerophillically in order to detect any colony forming units morphologically indicative of mycoplasmal contamination. Issuance of the final report with signature of the Laboratory Director signifies that the required controls were performed concurrently with the test sample(s) as detailed in the referenced SOPs and that all test conditions have been found to meet the required acceptance criteria for a valid test, including the appropriate results for the positive and negative controls.

Mycoplasma Testing Services

Safe Cells

MYCOPLASMA TESTING SERVICES

BIONIQUE TESTING LABORATORIES, INC

APPENDIX I

Document #:	DCF3008A
Edition #:	06
Effective date:	9/17/2003
Title:	DNA FLUOROCHROME ASSAY RESULTS

DNA-FLUOROCHROME ASSAY RESULTS

Procedures 3008, 3009, 3011

Sample ID # **57291** **M-250** Date Rec'd: **05/05/2009** P.O. #

Indicator Cells Inoculated: Date/Initials: 5/7/09 / HS

Fixation: Date/Initials: 5/11/09 / KG

Staining: Date/Initials: 5/11/09 / KG

TEST/CONTROL ARTICLE:

WA07-DL-3-S1 Code 7181

LOT# **NA**

Wicell QA

DNA FLUOROCHROME ASSAY RESULTS:

X **NEGATIVE:** A reaction with staining limited to the nuclear region, which indicates no mycoplasmal contamination.

_____ **POSITIVE:** A significant amount of extranuclear staining which strongly suggests mycoplasmal contamination.

_____ **INCONCLUSIVE:**

_____ A significant amount of extranuclear staining consistent with low - level mycoplasmal contamination or nuclear degeneration.

_____ A significant amount of extranuclear staining consistent with bacterial, fungal or other microbial contaminant or viral CPE. Morphology not consistent for mycoplasmal contamination.

COMMENTS: _____

Date: 5/11/09 Results Read by: KG Date of Review: 5-11-09 Reviewed by: SCA

WiCell Cytogenetics Report: 001026-042009
NSCB 3586

Report Date: April 27, 2009

Case Details:

Cell Line: *WA07-DL-3 (3586)*

Passage #: *34*

Date Completed: *4/27/2009*

Cell Line Gender: *Female*

Investigator: *National Stem Cell Bank*

Specimen: *hESC on MEF feeder*

Date of Sample: *4/20/2009*

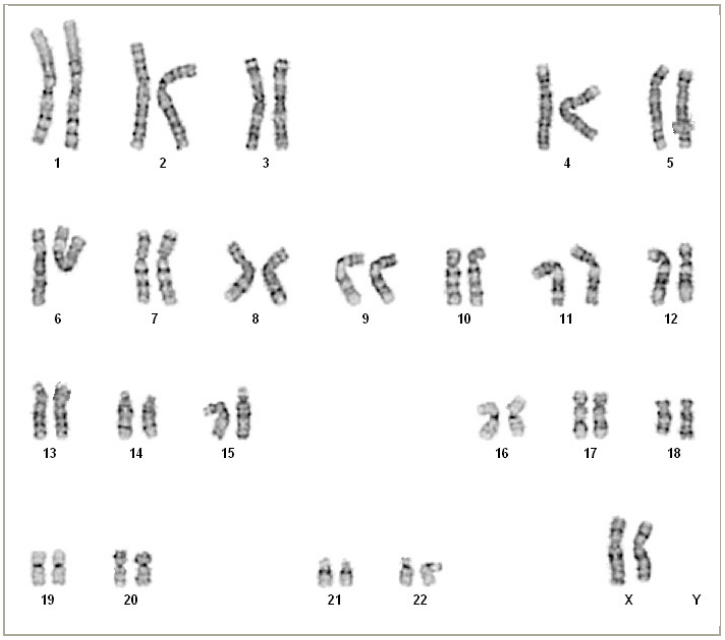
Tests,Reason for: *DL testing*

Results: *46,XX*

Completed by , CLSp(CG), on 4/27/2009

Reviewed and interpreted by , PhD, FACMG, on 4/27/2009

Interpretation: *No abnormalities were detected at the stated band level of resolution.*



Cell: *S01-01*

Slide: *A*

Slide Type: *Karyotyping*

Cell Results: *Karyotype: 46,XX*

# of Cells Counted: 20

# of Cells Karyotyped: 3

# of Cells Analyzed: 7

Band Level: 425-550

Results Transmitted by Fax / Email / Post **Date:**_____

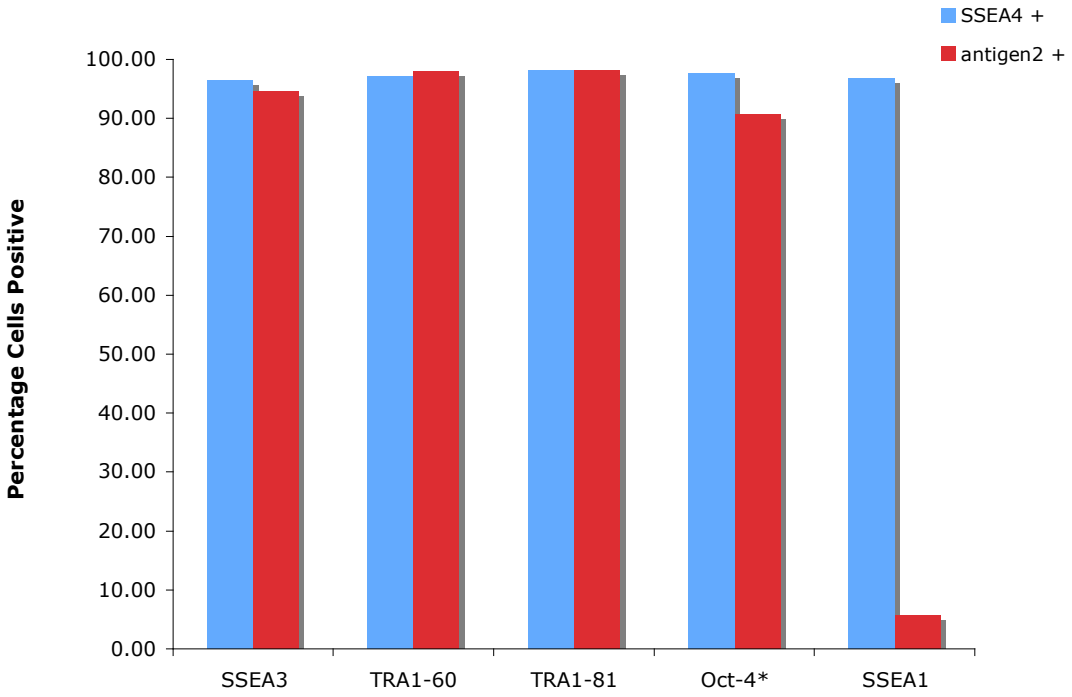
Sent By:_____ **Sent To:**_____

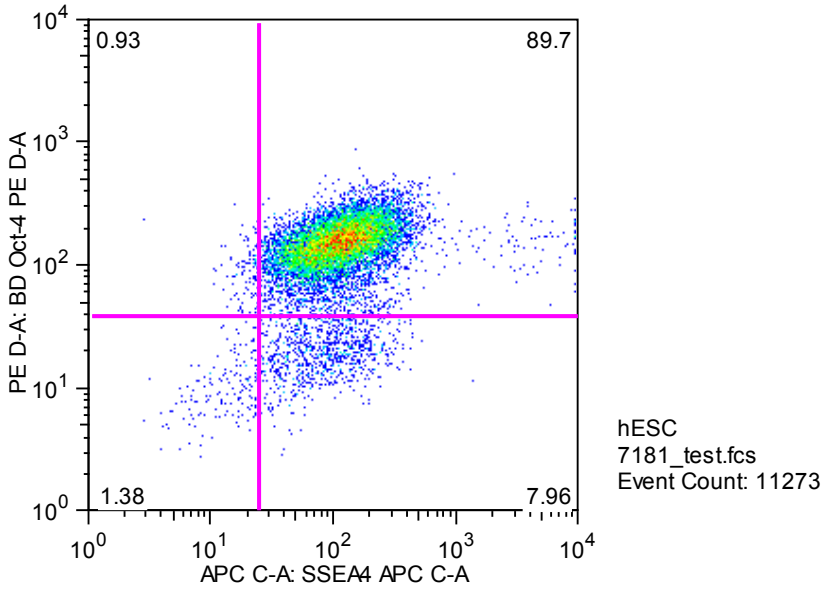
Procedures performed:
SOP-CH-101 SOP-CH-102
SOP-CH-103 SOP-CH-105

Cell Line: WA07-DL-03
Passage 36
Sample ID: 7181-FAC

Date of: *(mm/dd/yy)*
acquisition: 04/30/09
file creation: 04/30/09
file submission: 05/05/09

antigen2:	SSEA4 - antigen2 +	SSEA4 + antigen2 +	SSEA4 + antigen2 -	SSEA4 - antigen2 -	ALL SSEA4 +	ALL antigen2 +
SSEA3	0.69	93.90	2.63	2.77	96.53	94.59
TRA1-60	2.25	95.70	1.45	0.59	97.15	97.95
TRA1-81	1.44	96.70	1.46	0.37	98.16	98.14
Oct-4*	0.93	89.70	7.96	1.38	97.66	90.63
SSEA1	0.46	5.21	91.60	2.69	96.81	5.67





*PE-conjugated Oct-3/4 from BD Biosciences was used (cat #560186).