



Products For A Cleaner Environment

“Development, Production and
Testing of Coated_{patent pending} Skimmer
Technology”

CRUCIAL received its
ISO 9001:2000
certification in 2007 and
recertified to
ISO 9001:2008 in 2011



**PERRY JOHNSON
REGISTRARS, INC.**

Certificate of Registration

Perry Johnson Registrars, Inc., has assessed the Quality Management System of:

CRUCIAL, Inc.

142 Enterprise Drive, Gretna, LA 70056 United States

*(Hereinafter called the Organization) and hereby declares that
Organization is in conformance with:*

ISO 9001:2008

This Registration is in respect to the following scope of supply:

**Design, Manufacture, Distribution, Rental and Installation of
Accidental Oil Spill Containment and Recovery Equipment**

*Such products shall be manufactured by the Organization at, or such processes or services shall be offered at or
from, only the address given above. This Registration is granted subject to the system rules governing the
Registration referred to above, and the Organization hereby covenants with the Assessment body duty to observe
and comply with the said rules.*

For PJR:


Terry Boboige, President

Perry Johnson Registrars, Inc. (PJR)
755 West Big Beaver Road, Suite 1340
Troy, Michigan 48064
(248) 358-3388



The validity of this certificate is dependent upon ongoing surveillance.

Effection Date:
July 27, 2011

Expiration Date:
July 26, 2014

Certificate No.:
C2011-01867

**OHMSETT SKIMMER
TESTING –**

**TANKER OWNERS
OPERATING IN ALASKA**

OBJECTIVES

- INVESTIGATE THE POSSIBILITY OF UTILIZING OLEOPHILIC SKIMMERS IN PLACE OF THE EXISTING WEIR SKIMMERS
- INCREASE EFFICIENCY OF OIL RECOVERY DURING SPILL RESPONSE TO 360 GPM PURE OIL



**PRINCE WILLIAM SOUND
OPERATES WITH A SERIES OF
LARGE BARGES EQUIPPED WITH
A PAIR OF TRANSREC SKIMMERS
WHICH ARE DEPLOYED FROM
THE STERN OF EACH OF THE
BARGES.**

**ONCE DEPLOYED, THE WEIR
SKIMMERS ARE FLOATED TO
THE APEX OF THE “U” BOOM**



TEST METHOD

- **BASED ON F2709 ASTM APPROVED SKIMMER TEST STANDARD**
- **3" OIL SLICK DECLINING TO 2" TO MEASURE RECOVERY RATE AND EFFICIENCY**

TEST OILS

- **ANS CRUDE USED:**
 - * **FRESH**
 - * **WEATHERED**

TO REPLICATE 72-HOUR SPILL CLEANUP SCENARIO MANDATED BY STATE OF ALASKA

**CRUCIAL COATED
SKIMMER DESIGN
& BUILDING
DECEMBER 2007**



**MARINE GRADE ALUMINUM CATAMARAN
WITH DUAL HYDRAULICALLY DRIVEN DISC
BANKS, POSITIVE DISPLACEMENT PUMP**



COATING APPLIED TO 2 EA. TEST DISCS



COATED patent pending **TEST DISCS INSTALLED**

OHMSETT TESTING

MARCH, 2008

ORIGINAL SKIMMER DESIGN:

- 56 EACH 30-INCH DIAMETER ALUMINUM DISCS
- 2 EACH COATED patent pending TEST DISCS
- ALUMINUM DISCS REPLACED WITH 44 FIBER COATED patent pending DISCS



**RECOVERY RATES OBSERVED SHOWED GREATLY
INCREASED RECOVERY RATE ON THE 2 EA. TEST
COATED_{patent pending} DISCS AS OPPOSED TO SMOOTH DISCS**



**ALL ALUMINUM DISCS WERE REPLACED WITH
44 EA. FIBER COATED patent pending DISCS.
RECOVERY RATES REACHED OVER 200 GPM.**

Summary of Results

March 2008 Tests

Skimmer	ORR, gpm	ORE, %
Fresh Oil	128	67
Weathered Oil	150	81
Semi-weathered Oil	234	74



HOWEVER, IT WAS OBSERVED THAT A CONSIDERABLE AMOUNT OF OIL REMAINED ON THE DISCS AFTER SCRAPING.



IT WAS ALSO OBSERVED THAT IF THE DISCS WERE SCRAPED MORE, THE INCREASED VOLUME OF OIL WOULD HAVE TO BE DRAINED FROM THE FINGERS FASTER.

**MODIFY /
REDESIGN**

**MARCH - JULY,
2008**



**A SMALL TEST UNIT WAS USED TO
EVALUATE MODIFIED SCRAPER
DESIGNS**

**DOUBLE SCRAPER
BLADES WERE TESTED**

**ANGLED SCRAPER FINGER
ALONG WITH A MORE RIGID
SCRAPER BLADE SOLVED
BOTH CONDITIONS NOTED
IN THE MARCH TESTING**



**OHMSETT
DISC SKIMMER
TESTING
JULY, 2008**

SKIMMER DESIGN:

- 52 ALL FIBER COATED patent pending DISCS
- THICKER GAUGE SCRAPERS
- ANGLED SCRAPER FINGER FOR
FASTER DRAINING OF OIL



NEW SCRAPER DESIGN TESTED WELL AND RESULTED IN HIGHER RECOVERY EFFICIENCY. RECOVERY RATE OF APPROX. 400 GPM @ 85% EFFICIENT WERE ACHIEVED

Summary of Results (new scrapers) July 2008 Tests

Skimmer	ORR, gpm	ORE, %
Fresh Oil	386	77
Weathered Oil	402	87

OHMSETT TESTING
NOVEMBER, 2008
& MARCH, 2009

SKIMMER DESIGN

(200 CU.M/HR.):

- 88 EACH ALL FIBER COATED patent pending DISCS (4 BANKS OF 22 EA.)
- REDESIGNED SCRAPER BLADES
- DUAL POSITIVE DISPLACEMENT LOBE PUMPS



88-DISC SKIMMER CAPABLE OF RECOVERY OF APPROX. 880 GPM (200 CU.M/HR.) OF PURE OIL!

Summary of Result

March 2009 Tests

Test	Speed rpm	Test oil	ORR, gpm	ORE, %
5	31	Fresh	828	88
6	34	Fresh	874	77
7	32	Fresh	949	80

March, 2010
24-Hour Test &
Seaweed Test
88-Disc Skimmer
at Ohmsett



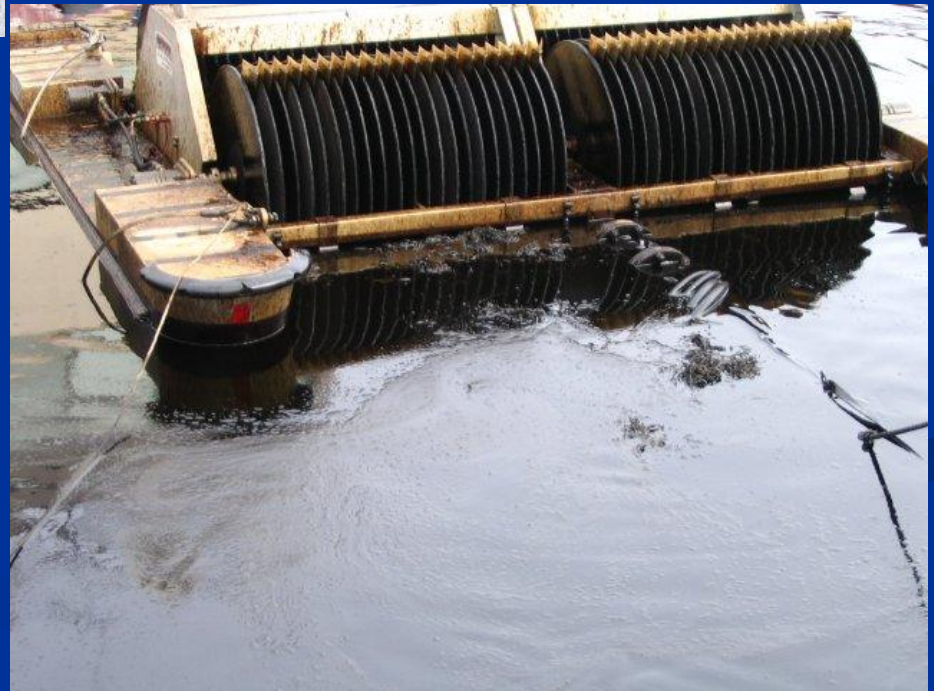
VISCOUS OIL BEING DRAWN INTO DISCS



**EVEN EMULSIFIED OIL AFTER BEING SKIMMED
& PUMPED ALL NIGHT LONG ARE EASILY
RECOVERED BY THE FUZZY DISCS**



**SEAWEED WAS ADDED TO
THE TEST TANK TO
EVALUATE THE SKIMMER
WITH DEBRIS PRESENT**



July 2009
Deployment Tests
By CISPRI
Homer, Alaska



**C-DISC 88/30 SKIMMER
WITH "V"-SWEEP
DEPLOYMENT**





**C-DISC 88/30
SKIMMER WITH
OCEAN BUSTER
DEPLOYMENT**



**C-DISC 88/30 SKIMMER
TESTING WITH BOOM
VANE DEPLOYMENT**

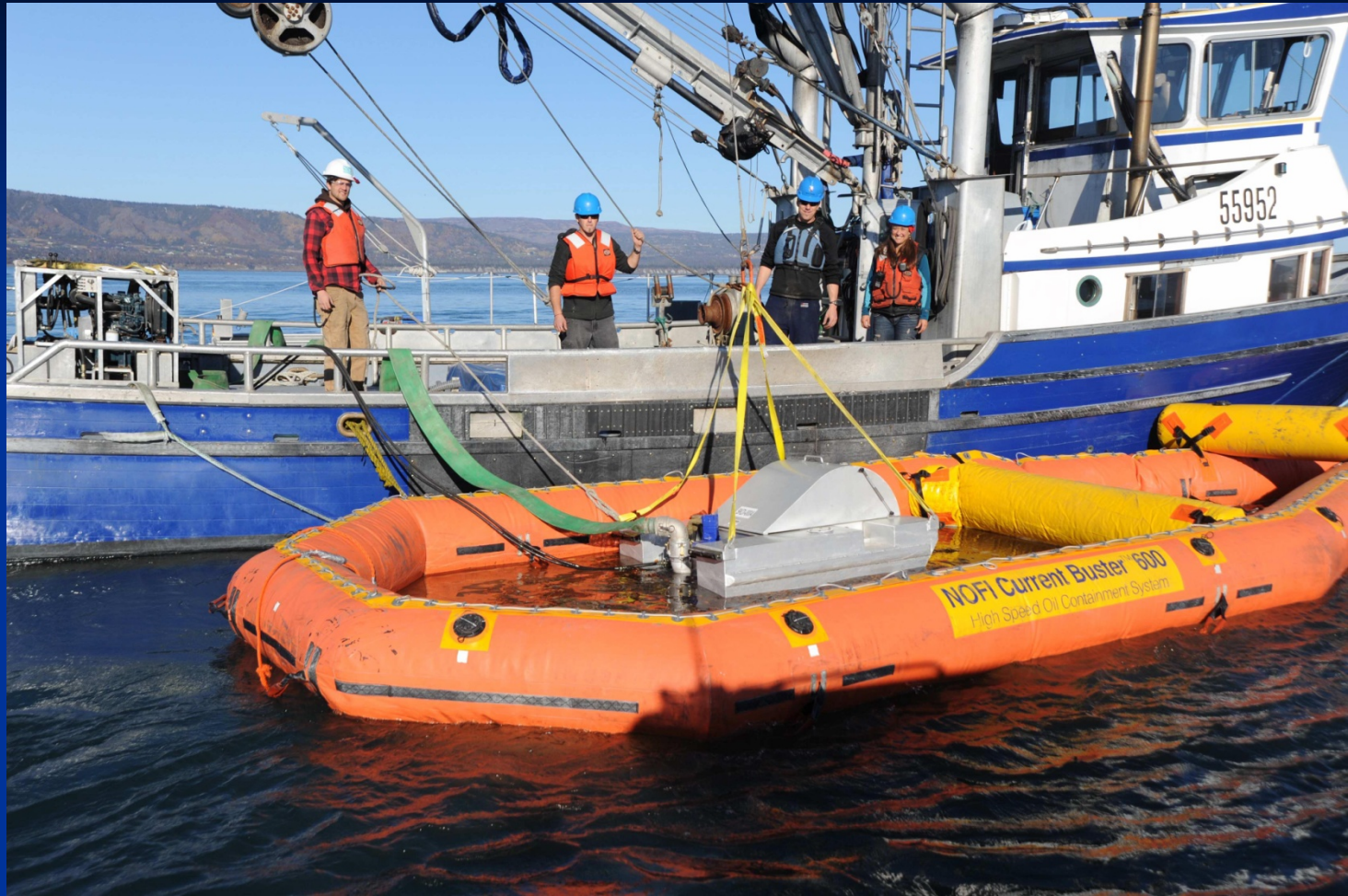


DESIGNING &
TESTING COMPLETE
LINE OF COATED
DISC SKIMMERS

CRUSHED ICE TEST - AUGUST, 2010



**ALASKA CLEAN SEAS C-DISC 13/24 IN TEST TANK
85 GPM (19 CU.M/HR.) @ 97% EFFICIENCY**



CISPRI UTILIZING LOCAL FISHERMAN AND CURRENT BUSTER FOR TRAINING WITH MODEL C-DISC 13/30



CISPRI – MODEL C-DISC 56/30 IN TEST TANK



**MSRC OPERATING C-DISC 88/30
DURING DEEPWATER HORIZON 2010**

2010

MSRC ordered 12 each
CRUCIAL Model 88/30
Coated
Disc Skimmer Systems



**MSRC UNITS WERE COMPLETED IN 2011
AND DELIVERED TO VARIOUS LOCATIONS**

2011

MSRC ordered 6 each
CRUCIAL Model 56/30
Coated
Disc Skimmer Systems

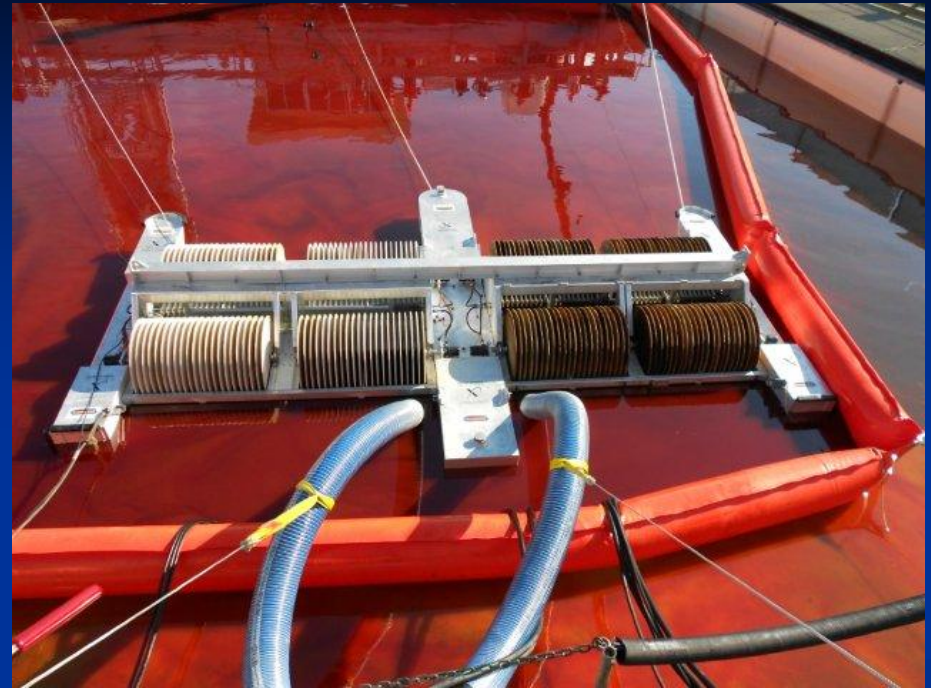


**MSRC UNITS WERE
COMPLETED IN 2011 AND
DELIVERED TO VARIOUS
LOCATIONS**



2011 CRUCIAL
ENTERED THE
Wendy Schmidt Oil
Cleanup X CHALLENGE
AND MADE THE
TOP 10 FINALIST

TWO OF CRUCIAL's 88-DISC MODULES WERE MOUNTED IN A TRIMARAN HULL FOR THE Wendy Schmidt Oil Cleanup X CHALLENGE



4 BANKS OF DISCS HAD NEW FABRIC COATING AND 4 BANKS OF DISCS HAD FABRIC PREVIOUSLY USED IN TESTING / SPILLS

C-DISC 13/30 with optional eductor

CISPRI December 2011



Skimmer	ORR, gpm	ORE, %
With eductor	138/129	91/94
Without eductor	123/121	92/94



**CRUCIAL MODEL C-DISC
13/30 TESTING
DECEMBER, 2011**

**IN ADDITION TO
RECOVERY TESTS,
CISPRI PERFORMED
DEPLOYMENT TESTS
WITH FISHING VESSELS**





2012

ALYESKA-SERVS

**CRUCIAL Model 88/30 Coated
Disc Skimmer System**



MODIFICATIONS INCORPORATED IN THESE UNITS :

- ROLLED ALUMINUM GUARD
ALONG TOP OF PONTOON TO
PROTECT PONTOON AND
CONTAINMENT BOOM**
- SINGLE POINT LIFT WELDED TO
FRAME**
- BULLNOSE DESIGN AT BOTH
ENDS OF PONTOONS FOR
SKIMMING IN BOTH DIRECTIONS**

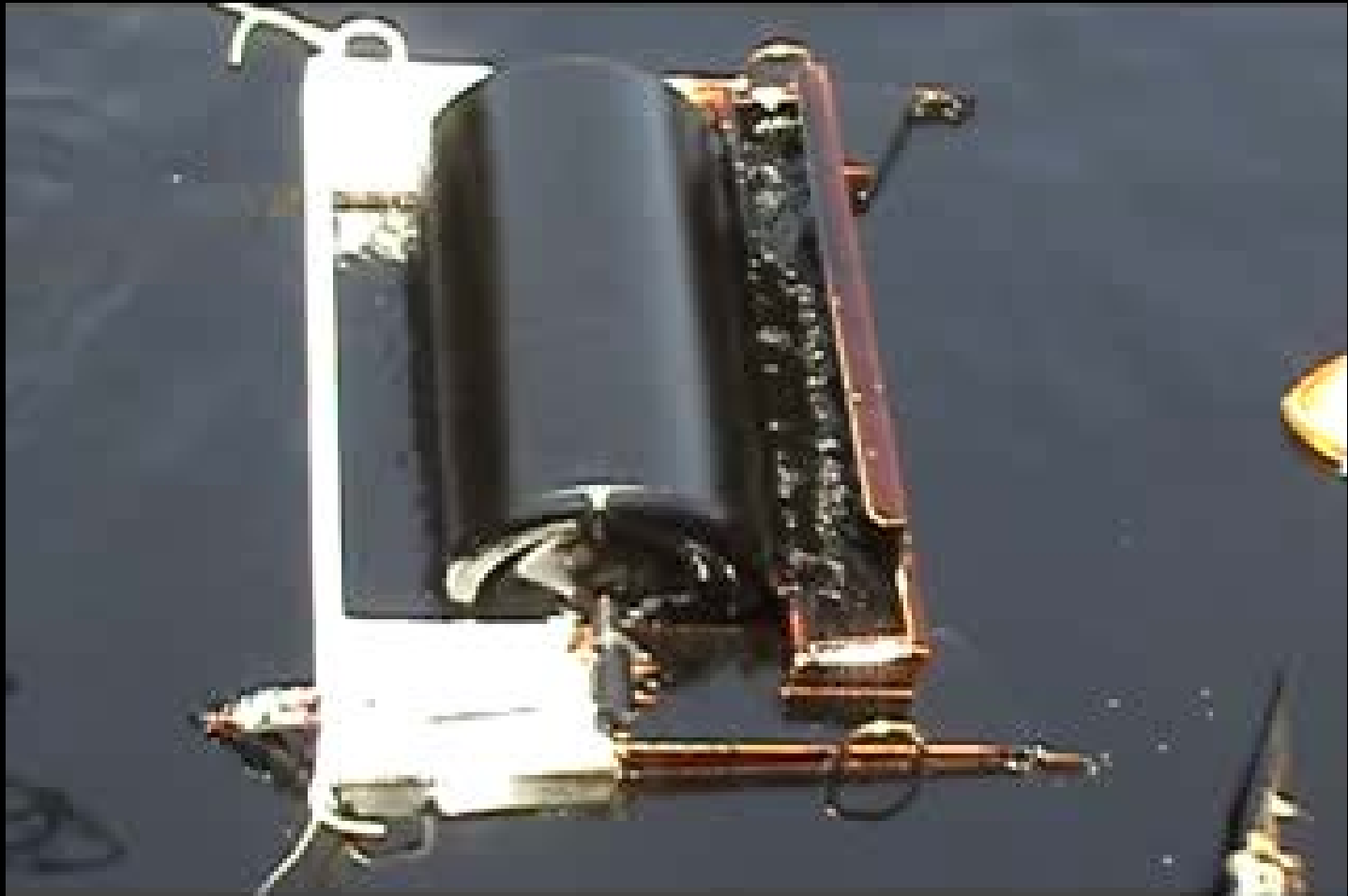
Model 88/30 deployment testing by Alyeska-SERVS in Alaska AUGUST, 2012



**CRUCIAL
COATED DRUM
SKIMMERS**

DRUM SKIMMER DESIGN:

- COATED patent pending
DRUM (VARIOUS
DIAMETERS AND
LENGTHS)
- HEAVY GAUGE
SCRAPERS
- OIL TRANSFER PUMP



CRUCIAL HAS OPENED A NEW DOOR TO INCREASED OIL SPILL RECOVERY RATES WITH OUR INNOVATIVE DESIGN.



**CLEAN HARBORS COOP –
36 INCH COATED DRUM SKIMMER ON SPILL**



CLEAN HARBORS QUICK DEPLOYMENT RACKS – 2 SKIMMERS PER RACK FOR EFFICIENT LOADING ONTO TRUCKS OR TRAILERS

CLEAN RIVERS COOP – PORTLAND, OR



SELECTED 2 MODELS
OF COATED DRUM:
-MINI CD
- 1CD18H-36"

CISPRI TESTING – AUGUST 2012



MODEL 1CD18H-36 COATED DRUM SKIMMER

Skimmer	ORR, gpm	ORE, %
ANS Crude	54	99
ULSD#2	50	96



**CRREL TESTING
FACILITY
JANUARY, 2013**

**CRUCIAL'S MODEL
1CD18-36 DRUM
SKIMMER IN ICE
CONDITIONS**



**CRUCIAL'S
COATING CAN BE
RETROFITTED TO DISC
AND DRUM SKIMMERS
MANUFACTURED BY
OTHERS.**



**THIS IS AN AQUA-GUARD
DISC SKIMMER WHERE
THE DISCS ARE MODIFIED
WITH CRUCIAL'S UNIQUE
FABRIC COATING**





**WE CAN ALSO RETROFIT
DRUM SKIMMERS
MANUFACTURED BY OTHER
WITH THIS COATING TO
INCREASE THE RECOVERY
RATE UP TO 10 TIMES OVER
SMOOTH DISCS & DRUMS.**

**THIS DOUBLE DRUM
SKIMMER FROM
CANATEC WAS
CONVERTED FROM
SMOOTH DRUMS USING
OUR UNIQUE FABRIC
COATING**



