



Atomics International Division  
Rockwell International

U

CLASSIFICATION LEVEL  
(S, C OR U)

DOCUMENT NO.

TI-700-28-011

# COVER SHEET

**DOCUMENT TITLE**

Fabrication of Nickel-Gadolinium Oxide Foil Sleeves for  
SNAPTRAN

**AUTHOR**

M. W. Mahoney

**NOTICE**  
This report was prepared as an account of work sponsored by the United States Government. Neither the United States nor the United States Energy Research and Development Administration, nor any of their employees, nor any of their contractors, subcontractors, or their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness or usefulness of any information, apparatus, product or process disclosed, or represents that its use would not infringe privately owned rights.

THIS IS AN INTERNAL WORKING DOCUMENT AND MAY BE EXPANDED, MODIFIED, OR WITHDRAWN AT ANY TIME.  
~~IT IS INTENDED FOR INTERNAL USE ONLY.~~

CLASSIFICATION TYPE  
(RD OR DI)

~~THIS REPORT MAY NOT BE PUBLISHED WITHOUT THE APPROVAL OF THE PATENT BRANCH, AEC.~~

This report was prepared as an account of work sponsored by the United States Government. Neither the United States nor the United States Atomic Energy Commission, nor any of their employees nor any of their contractors, subcontractors or their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness or usefulness of any information, apparatus, product or process disclosed, or represents that its use would not infringe privately owned rights.

U

CLASSIFICATION LEVEL  
(S, C OR U)

**MASTER**

DO NOT REMOVE THIS SHEET  
DISTRIBUTION OF THIS DOCUMENT UNLIMITED

20

## **DISCLAIMER**

**This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency Thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.**

## **DISCLAIMER**

**Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.**



**ATOMICS INTERNATIONAL**  
 a division of North American Aviation, Inc  
**ENGINEERING DOCUMENT**

DOCUMENT NO.  
 TI-700-28-011

DOCUMENT TYPE Foil Sleeves  
 Technical Information

DATE  
 January 9, 1968

PREPARED BY M. W. Mahoney DEPT & GROUP NO. 737-72

REV PAGE 1 OF 3

APPROVALS *D. E. Johnson 1-23-68*  
*[Signature]*

REF DWG OR SPEC NO.

SECURITY CLASSIFICATION

(CHECK ONE BOX ONLY)	(CHECK ONE BOX ONLY)
UNCL. <input checked="" type="checkbox"/>	RESTRICTED DATA <input type="checkbox"/>
CONF. <input type="checkbox"/>	DEFENSE INFO. <input type="checkbox"/>
SECRET <input type="checkbox"/>	

TITLE  
 Fabrication of Nickel-Gadolinium Oxide Foil Sleeves for SNAPTRAN

AUTHORIZED CLASSIFIER *[Signature]* DATE *1-22-68*

ABSTRACT A requirement exists for sleeves made of nickel foil containing selected concentrations of  $Gd_2O_3$  as a dispersion. The foils will be installed around individual SNAP-10A fuel elements for special physics tests. A brief program was successfully conducted to develop the process for fabrication of the required sleeves.

DISTRIBUTION	REV	SUMMARY OF CHANGE	APPROVALS & DATE
C. T. Armenoff			
L. L. Bienvenue			
J. L. Boyer			
R. Detterman			
R. B. Gordon			
J. Hawley			
D. E. Johnson			
M. W. Mahoney			
L. Maki			
C. P. Messina			
G. W. Meyers			
T. G. Parker, Jr.			
J. T. Roberts			
A. Thiele			
J. H. Walter			
J. Weber			

# ATOMICS INTERNATIONAL

A Division of North American Aviation, Inc.

NO. TI-700-28-011

DATE January 9, 1968

PAGE 2 OF 3

Objective: The objective of this program is to develop a resistance spot welding method for use during fabrication of nickel-gadolinium sleeves for SNAPTRAN fuel elements.

Purpose: The purpose of the program is to fabricate removable nickel sleeves containing various concentrations of gadolinium oxide. The sleeves must be welded such that remote application and removal from fuel elements is possible without damage to the sleeves. The sleeves are to be used in physics tests of a SNAP-10 core.

Technical Approach: To insure easy remote application and removal of the foil sleeves, 9 practice sleeves of 3 different gadolinium oxide concentrations were fabricated. All fabrication problems except one were solved. The one problem that remains is the copper electrodes sticking to the nickel foil and occasionally causing a small hole. Technically this problem has no bearing on the usefulness of the foil sleeves. However, the problem will be solved by use of different materials for electrodes and different configurations for the electrode tips. There are no requirements concerning the welding other than ease of remote application and removal.

The 1.260-inch diameter cylindrical sleeves are fabricated in lengths of  $12.40^{+.040}_{-.000}$  inches. The equipment used was a Unitek Weldamatic resistance spot welder with weld parameters of 20 watt-sec and a pressure of 3-4 pounds. The foil is wrapped around a graphite mandrel with a maximum overlap of 1/8 of an inch and secured with rubber bands. The mandrel is held in V-blocks beneath copper electrodes which are applied along the overlap seam using a foot control. A picture of the apparatus is included. With this method of operation the welding can be accomplished by one man. No fabrication problems are foreseen provided material received is in good condition and is cut to proper dimensions.

# ATOMICS INTERNATIONAL

A Division of North American Aviation, Inc.

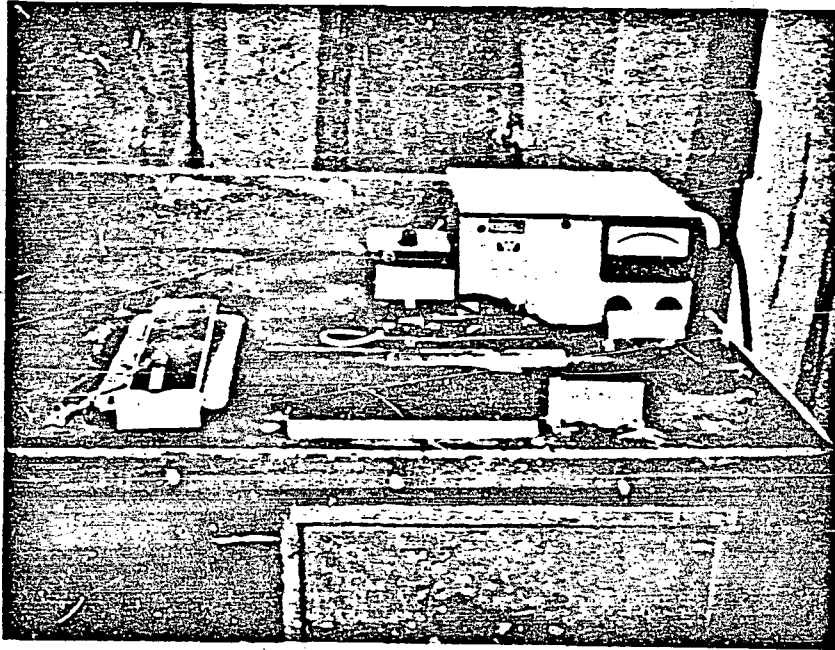
NO. TI-700-28-011

DATE January 9, 1968

PAGE 3 OF 3

The following cost estimate assumes fabrication of 150 sleeves with the foil cut to proper dimensions.

	<u>Hours</u>
Engineering, Planning, Reporting, Scheduling and overall surveillance -----	50
Fabrication -----	<u>225</u>
Total	<u>275</u>



Fabrication of Nickel Foil Sleeves