



## ISIS REPORT

December 14, 2009

Below are the Farsi and English versions of the document outlining Iranian work on the neutron initiator. ISIS analyzed the document in a report [here](#). The Times of London report on these documents can be found [here](#).



Source: Times of London

2-1- راه اندازی مجدد راکتور تولید گاز D با توجه به نیاز سیستم های P.F و عدم امکان تهیه گاز آن.

2-2- طراحی و ساخت آزمایشگاه سیار مناسب.

2-3- راه اندازی مجدد راکتور تولید مواد و نصب آن در Glove Box.

2-4- نصب و راه اندازی دستگاههای مورد نیاز تولید مواد چشمه در آزمایشگاه سیار.

2-5- مونتاژ چشمه برای تستهای مورد نظر.

2-6- ادامه فعالیت بر روی مواد جایگزین نظیر TiD2 برای اجتناب از الودگی U در تولید UD3.

3- انجام محاسبات و شبیه سازی های ویژه.

3-1- انجام محاسبات و تکمیل محاسبات نوترونیك مربوط به چشمه.

3-2- انجام محاسبات هیدرودینامیک چشمه.

3-3- طراحی سیستم تست مواد چشمه.

الزامات دستیابی به اهداف برنامه:

1- ایجاد شرایط آزمایشگاهی مناسب.

2- تامین نیروی انسانی تحقیقاتی مورد نیاز برای انجام فعالیتهایی که نیازمند حفظ حیطه فعالیت است. این گونه فعالیتهای غالباً قابل تعریف و انجام توسط مراکز تحقیقاتی دیگر نمی باشد و الزاماً باید در درون مجموعه و توسط افراد قابل اعتماد انجام شود. در حال حاضر تعداد پرسنل موجود برای برخی از فعالیتهای ویژه در زمینه محاسبات نوترونی کافی نمی باشد. البته الزامی به استخدام رسمی افراد نمی باشد اما لازم است برای بکارگیری آنها تمهیدات ویژه حفاظتی در نظر گرفته شود. مناسبترین راه استفاده از افرادی است که قبلاً در پروژه های محاسباتی مربوطه فعالیت داشته اند.

3- در مورد مکان آزمایشاتی که در انستیتو قابل انجام نمی باشد و تعیین محل مناسب برای انجام آنها تصمیم گیری گردد. در همین راستا لازم است محل سابق انجام این آزمایشات نیز تعیین تکلیف گردد.

نکات مورد توجه:

برای این اجرای پروژه به همکاری 2 نفر با تحصیلات دکتری (PhD) نیاز می باشد. که هرکدام به طور متوسط ماهانه 80 ساعت فعالیت خواهند داشت. مجموع فعالیت این افراد 4160 نفر ساعت می باشد که 1280 نفر ساعت (900 نفر ساعت در قالب فعالیتهای ویژه و 380 نفر ساعت در قالب فعالیتهای عادی) آن باید توسط انستیتو تامین گردد. این فعالیتهای با همکاری آقایان... از انستیتو انجام خواهد شد. بقیه فعالیت ها (2880 نفر ساعت) در قالب فعالیتهای محاسباتی است که با جزئی کردن آنها توسط همکاران ساعتی و مسئولیت دکتر م قابل انجام است.

برای این اجرای پروژه به همکاری 4 نفر با تحصیلات کارشناسی ارشد نیاز می باشد. که هرکدام به طور متوسط ماهانه 230 ساعت فعالیت خواهند داشت. مجموع فعالیت این افراد 21920 نفر ساعت می باشد که 3920 نفر ساعت (2220 نفر ساعت در قالب فعالیتهای ویژه و 1700 نفر ساعت در قالب فعالیتهای عادی) آن باید توسط انستیتو تامین گردد. این فعالیتهای با همکاری آقایان... از انستیتو انجام خواهد شد. بقیه فعالیت ها (18000 نفر ساعت) در قالب فعالیتهای محاسباتی است که با جزئی کردن آنها توسط همکاران ساعتی و مسئولیت دکتر م قابل انجام است.

برای این اجرای پروژه به همکاری 2 نفر با تحصیلات کارشناسی نیاز می باشد. که هرکدام به طور متوسط ماهانه 50 ساعت فعالیت خواهند داشت. مجموع فعالیت این افراد 2525 نفر ساعت (1250 نفر ساعت در قالب فعالیتهای ویژه و 1275 نفر ساعت در قالب فعالیتهای عادی) می باشد که باید توسط انستیتو تامین گردد. این فعالیتهای با همکاری آقایان... از انستیتو انجام خواهد شد.

بخشهای محاسباتی (ردیفهای 21 الی 45) با مدیریت دکتر م و پس از تدارک منابع انسانی مورد نیاز و مورد تأیید کمیته انجام می شود.

Source: Times of London

*In the name of God*

## **Outlook for special neutron-related activities over the next 4 years**

### Introduction

The general document that refers to the special duties of the neutron group mentions four main topics that cover special neutron-related activities, namely:

1. Calculation and simulation
2. Production of source materials
3. Source assembly
4. Design and performance of experiments to test the source

The fourth item is dependent upon the ease of finding methods for detecting pulsed neutrons obtained from hot and cold sources at various stages. In this introduction we will describe below the programme for special neutron-related activities. We have also endeavoured to prioritise each subject in the light of the current political climate and our existing capabilities.

### Priority programmes for finding methods for detecting pulsed neutrons obtained from hot and cold sources

#### 1-1 Providing the required detectors and electronic equipment

At present, our capabilities are reasonably good although, of course, not perfect. For those areas that fall short of requirements, we must attempt to resolve the situation by creating, designing and purchasing solutions under ordinary project arrangements. In order to achieve this goal, meetings must first be arranged between the Centre's neutron experts and its scientific consultants. On completing the required investigations, these shortcomings should be eliminated and a method of meeting our requirements should be investigated.

#### 1-2 Designing and performing experiments to detect pulsed neutrons obtained, for example, from NG and PF pulsed sources

The studies already performed, on which a report will be issued in the very near future, indicate that there should be no adverse or destructive consequences in using the existing NGs. As a result, provided that the necessary security and protective measures are adopted, we should be able to use the existing NGs to conduct the pulsed-neutron detection experiments and to modify some of the previous experiments. Performing these experiments would enable our personnel to gain more knowledge of the subject. In view of Iran's situation and considering that the policy adopted by the Centre is to co-operate with research centres and universities in order to carry out its projects, under the Centre's supervision and control, we consider that for the moment the work on NG and PF systems should be carried out at other research centres. To promote the Centre's aims, a reciprocal agreement should be drawn up between the Institute of Physics and the universities and research centres so as to facilitate the above-mentioned projects. In view of the existing co-operation between Shaheed Beheshti University and the Institute of Physics, initially a reciprocal agreement should be drawn up whereby, as soon as the situation allows and Shaheed Beheshti University is ready, the NG system should be transferred to the University and the relative projects be performed there with the co-

Source: Times of London

operation of experts from the Centre. As regards the document that covers ordinary activities, the production of other PF samples is still achievable. It is possible, by protecting our capability regarding PFs at Shaheed Beheshti University, to produce more samples by mutual co-operation, then present these samples to other research centres for marketing purposes.

1-3 Creating experimental conditions similar to real conditions in order to detect pulsed neutrons obtained from hot sources

1-4 Designing and performing source detection experiments

1-4-1 Designing and performing detection experiments using NGs and PFs

1-4-2 Designing and performing detection experiments using a hot source

2 – Producing materials and assembling the source

2-1 Setting up the reactor again to produce D gas to meet the requirements of PF systems and the impossibility of supplying such gas

2-2 Designing and building suitable mobile laboratories

2-3 Setting up the reactor again that produces the materials and placing it in the glove box

2-4 Installing and setting up the equipment required to produce source materials in the mobile laboratories

2-5 Assembling the source for the required tests

2-6 Continuing the work of replacement materials such as TiD<sub>2</sub> in order to avoid U pollution on the production of UD<sub>3</sub>

3 – Performing the calculations and special simulations

3-1 Performing calculations and completing the neutron-related calculations regarding the source

3-2 Performing calculations regarding source hydrodynamics

3-3 Designing the system for testing source materials

*Requirements to achieve the programme's goals*

1 – Creating the appropriate conditions for conducting the experiments

2 – Providing the manpower to carry out the research and perform the work required to protect the scope of the activities. This work cannot usually be defined and performed by other research centres so usually needs to be carried out by trustworthy personnel within the organisation. In some areas, there are currently insufficient numbers of

Source: Times of London

personnel to cover the field of neutron calculation. Of course, it is not necessary to employ permanent staff but, if they are to be employed, specific safeguards must first be put in place. The most appropriate way of obtaining the required personnel is to employ individuals who were involved in the relevant calculation projects in the past.

3— Taking decisions on finding the appropriate location to conduct experiments which cannot in practice be conducted within the Institute. Furthermore, decisions must be taken regarding the locations where such experiments used to be conducted.

#### Important considerations

For this project we require two individuals who hold a PhD. Each of them must work 80 hours per month for a total of 4,160 man-hours of which 1,280 man-hours must be provided by the Institute (900 man-hours in the form of specialised work and 380 man-hours in the form of ordinary work). This work will be performed with the co-operation of Messrs..... from the Institute. The remaining work (2,880 man-hours) will be performed in the form of calculation activities, shared between hourly-paid workers under the responsibility of Dr. M.

For this project we also require 4 individuals who hold a masters degree. Each of them must work an average of 230 hours per month. These individuals must work a total of 2,120 man-hours of which 3,920 man-hours must be provided by the Institute (2,220 man-hours in the form of specialised work and 1,700 man-hours in the form of ordinary work). This work will be performed with the co-operation of Messrs..... from the Institute. The remaining work (18,000 man-hours) will be performed in the form of calculation activities, shared between hourly-paid workers under the responsibility of Dr. M.

For this project we require two individuals who hold a masters degree. Each of them must work an average of 50 hours per month. These individuals must work a total of 2,525 man-hours which must be provided by the Institute (1,250 man-hours in the form of specialised work and 1,275 man-hours in the form of ordinary work). This work will be performed with the co-operation of Messrs..... from the Institute. The calculation work (Sections 21 to 45) will be performed under the responsibility of Dr. M, after the Committee has approved the recruitment of the required personnel.

## Source: Times of London