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الهيئة العربية للطاقة الذرية
بالتعاون مع سديم للطاقة
Online Training on

رؤية تحليله للمواد الاشعاعية في صناعة النفط والغاز وتقييم مخاطرها

سديم SADEEM

الهيئة العربية للطاقة الذرية

لمحة تاريخية عن المواد الاشعاعية
وعلاقتها بالنفط والغاز

عرض الأدبيات

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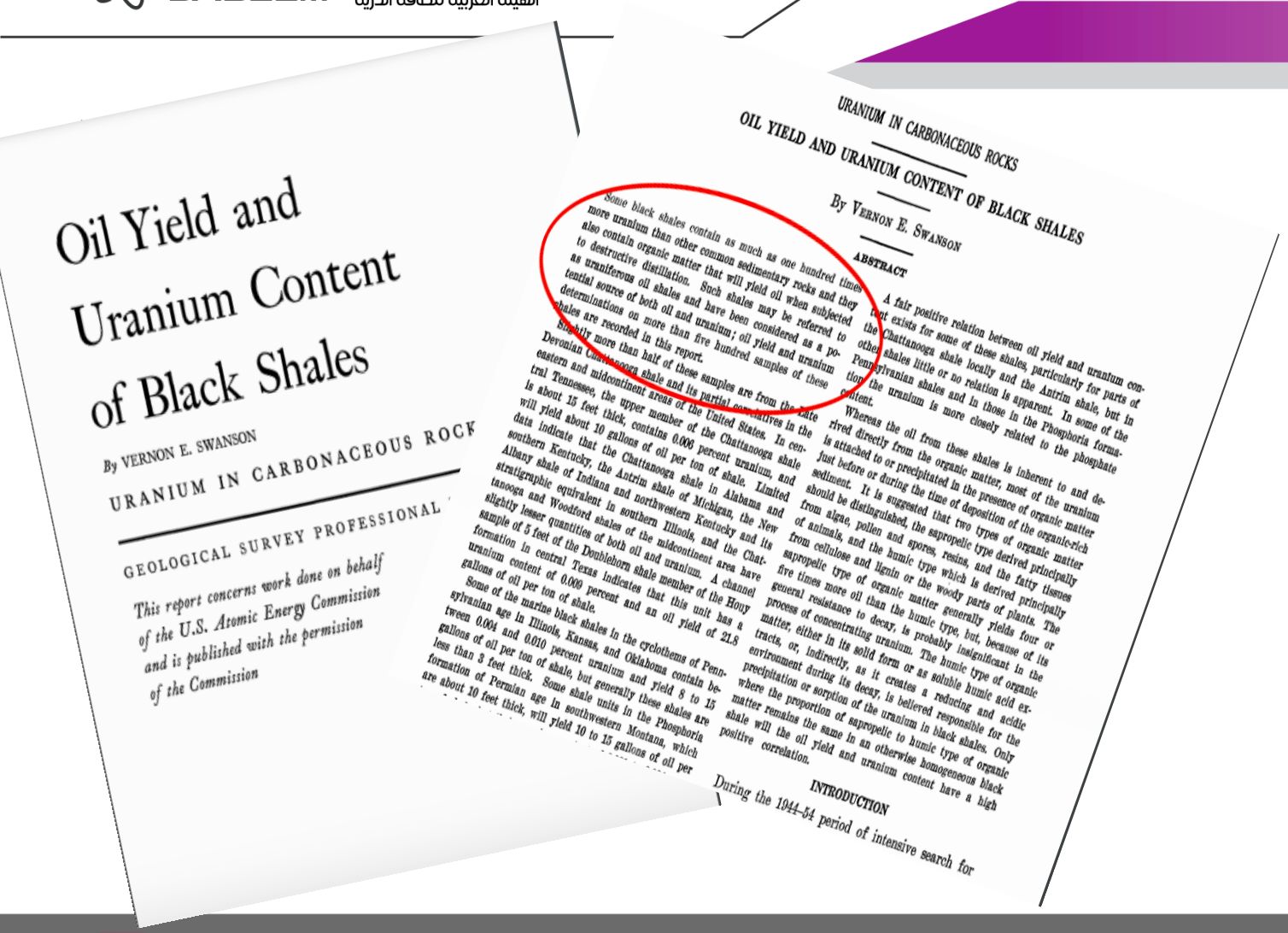

Oil Yield and Uranium Content of Black Shales

By VERNON E. SWANSON

URANIUM IN CARBONACEOUS ROCK

GEOLOGICAL SURVEY PROFESSIONAL

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URANIUM IN CARBONACEOUS ROCKS

OIL YIELD AND URANIUM CONTENT OF BLACK SHALES

By VERNON E. SWANSON

ABSTRACT

Some black shales contain as much as one hundred times more uranium than other common sedimentary rocks and they also contain organic matter that will yield oil when subjected to destructive distillation. Such shales may be referred to as uraniferous oil shales and have been considered as a potential source of both oil and uranium; oil yield and uranium determinations on more than five hundred samples of these shales are recorded in this report.

Slightly more than half of these samples are from the Late Devonian Chattanooga shale and its partial equivalents in the eastern and midcontinent areas of the United States. In central Tennessee, the upper member of the Chattanooga shale is about 15 feet thick, contains 0.006 percent uranium, and will yield about 10 gallons of oil per ton of shale. Limited data indicate that the Chattanooga shale in Alabama and southern Kentucky, the Antrim shale of Michigan, the New Albany shale of Indiana and northwestern Kentucky and its stratigraphic equivalent in southern Illinois, and the Chattanooga and Woodford shales of the midcontinent area have slightly lesser quantities of both oil and uranium. A channel sample of 5 feet of the Doublehorn shale member of the Hovy formation in central Texas indicates that this unit has a uranium content of 0.009 percent and an oil yield of 21.8 gallons of oil per ton of shale.

Some of the marine black shales in the cyclothems of Pennsylvanian age in Illinois, Kansas, and Oklahoma contain between 0.004 and 0.010 percent uranium and yield 8 to 15 gallons of oil per ton of shale, but generally these shales are less than 3 feet thick. Some shale units in the Phosphoria formation of Permian age in southwestern Montana, which are about 10 feet thick, will yield 10 to 15 gallons of oil per

A fair positive relation between oil yield and uranium content exists for some of these shales, particularly for parts of the Chattanooga shale locally and the Antrim shale, but in other shales little or no relation is apparent. In some of the Pennsylvanian shales and in those in the Phosphoria formation the uranium is more closely related to the phosphate content.

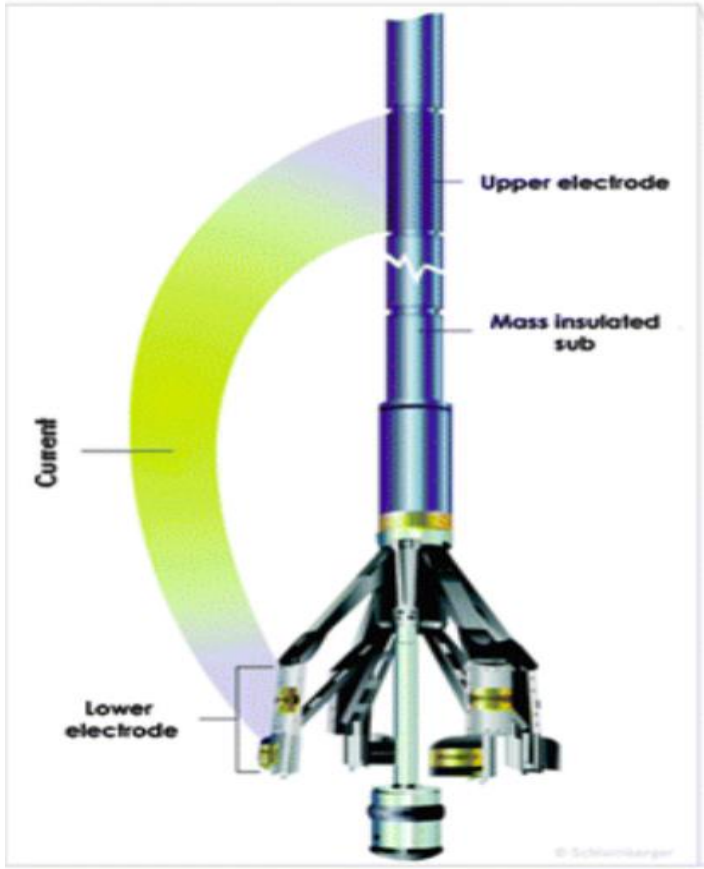
Whereas the oil from these shales is inherent to and derived directly from the organic matter, most of the uranium is attached to or precipitated in the presence of organic matter just before or during the time of deposition of the organic-rich sediment. It is suggested that two types of organic matter should be distinguished, the sapropelic type derived principally from algae, pollen and spores, resins, and the fatty tissues of animals, and the humic type which is derived principally from cellulose and lignin or the woody parts of plants. The sapropelic type of organic matter generally yields four or five times more oil than the humic type, but, because of its general resistance to decay, is probably insignificant in the process of concentrating uranium. The humic type of organic matter, either in its solid form or as soluble humic acid extracts, or, indirectly, as it creates a reducing and acidic environment during its decay, is believed responsible for the precipitation or sorption of the uranium in black shales. Only where the proportion of sapropelic to humic type of organic matter remains the same in an otherwise homogeneous black shale will the oil yield and uranium content have a high positive correlation.

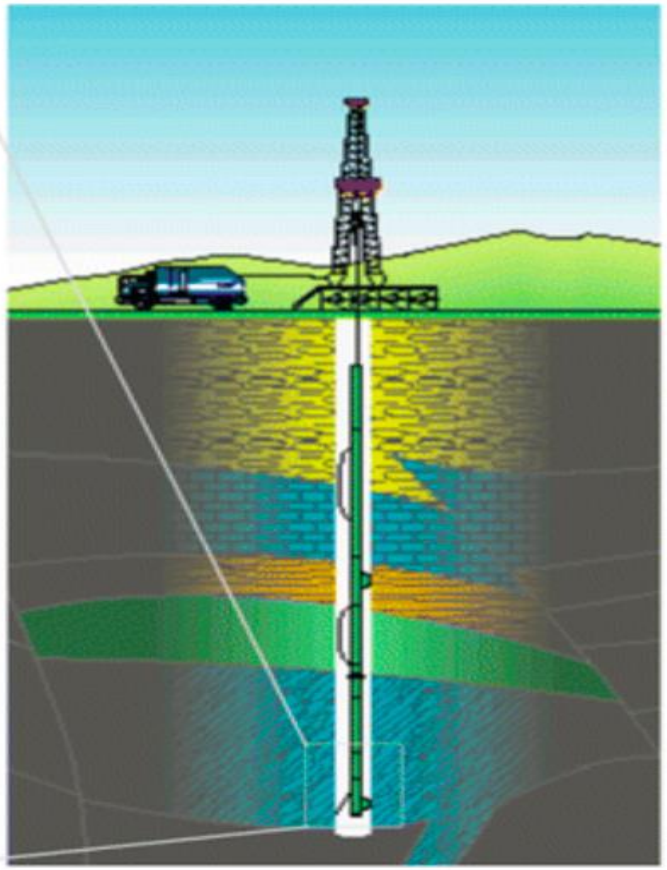
INTRODUCTION

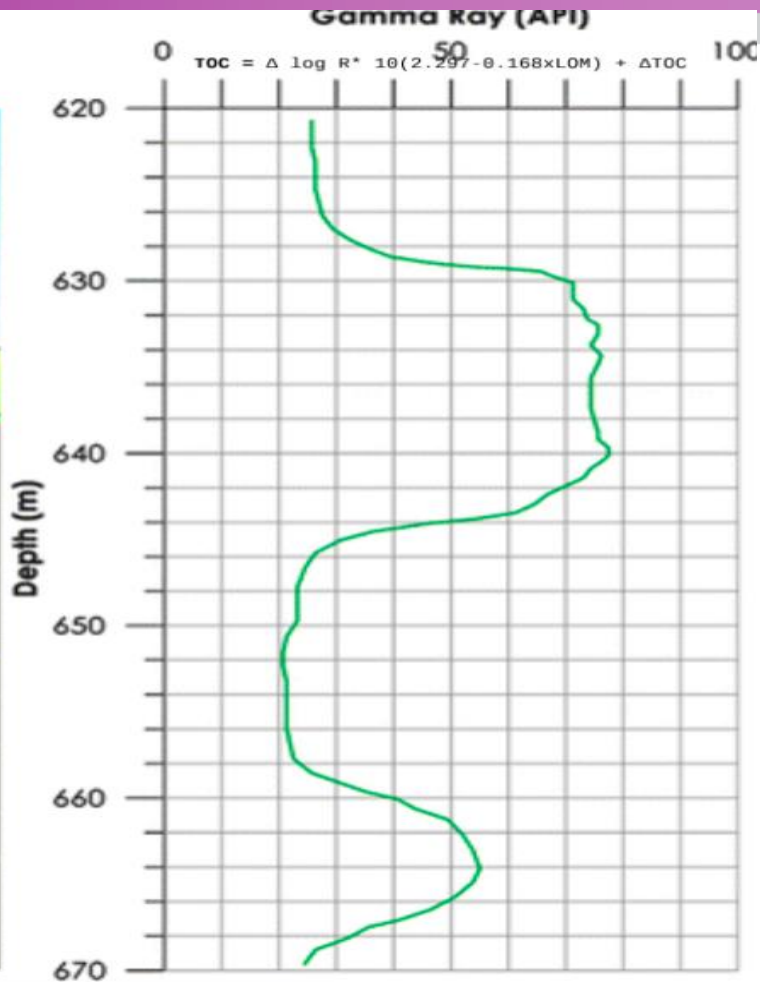
During the 1944–54 period of intensive search for

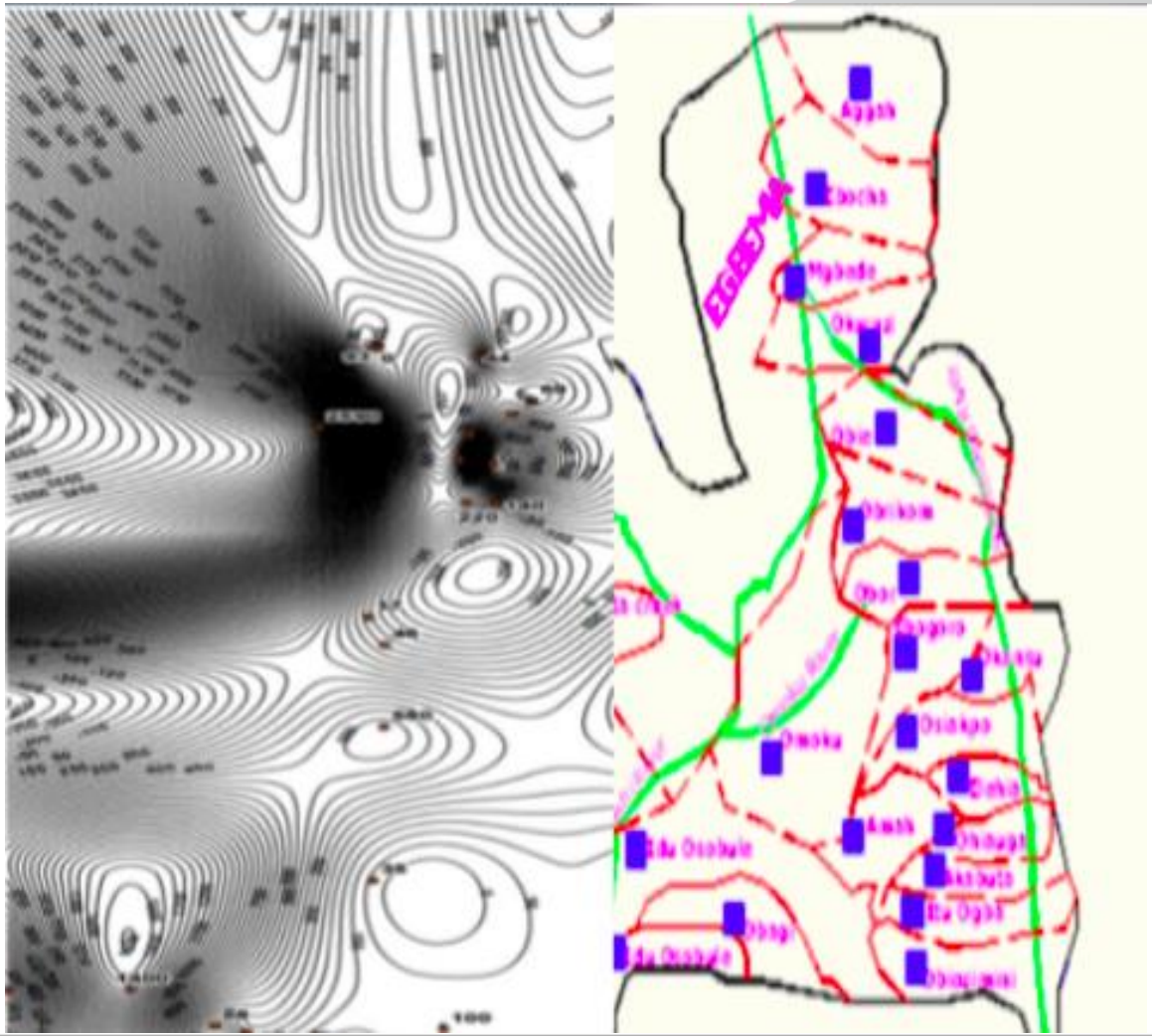
ما هي العلاقة بين المواد الاشعاعية والنفط والغاز من منظور علم الجيوكيمياء؟

المواد الاشعاعية لقياس وفرة النفط









ما الفرق بين المواد الاشعاعية طبيعية المنشأ والمواد الاشعاعية المعززة تقنيا؟

TENORM Expected Exposure Location

أماكن تواجد المواد الاشعاعية في صناعة النفط والغاز

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الهيئة العربية للطاقة الذرية

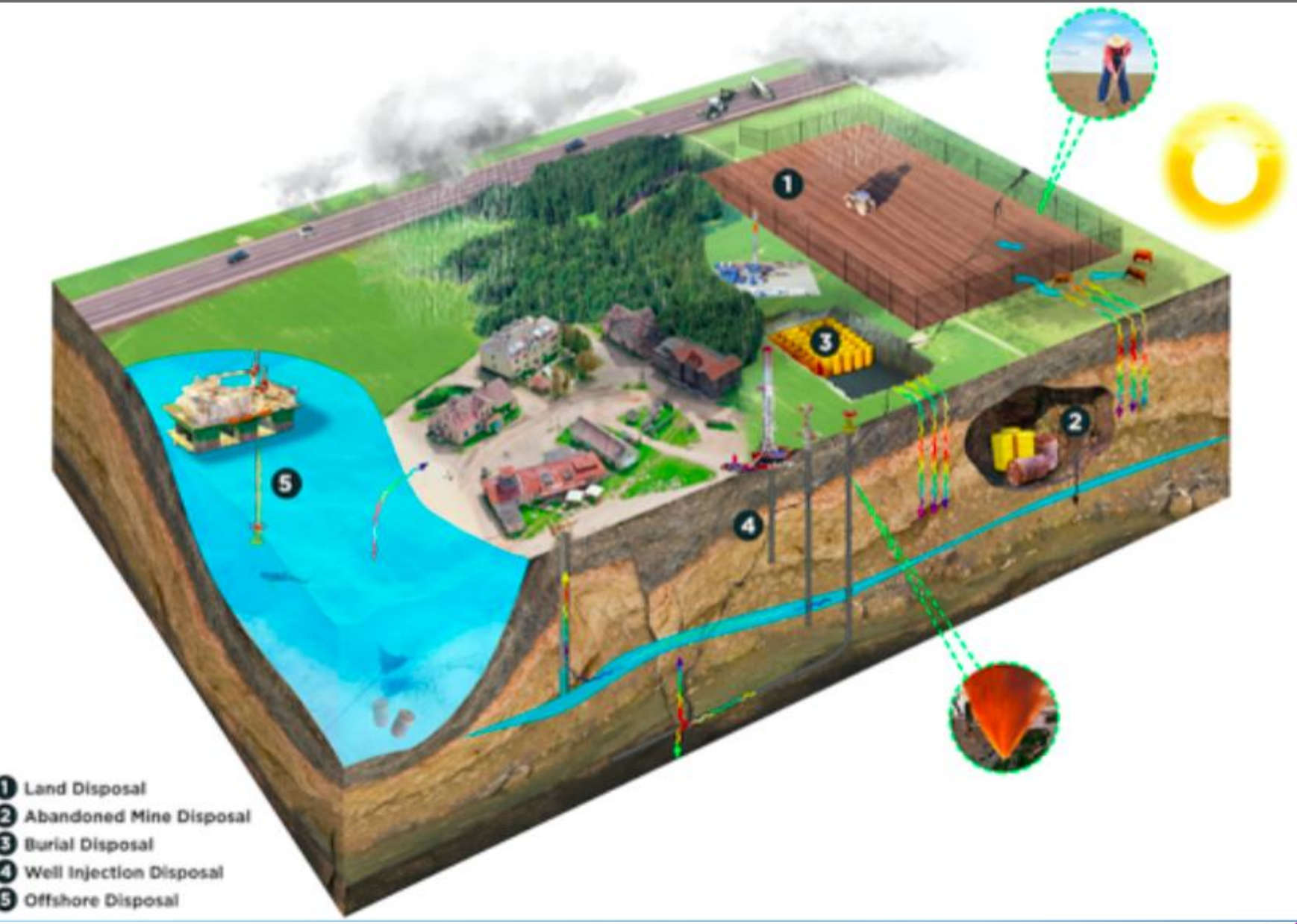
اشكال النفايات الاشعاعية الشائعة في صناعة النفط والغاز

١- مياه جيولوجية مصاحبة ملوثة

٢- قصاصات حفر

٣- رواسب على شكل حمآه او قشور

٤- غشاء غازي



طرق التخلص الشائعة للنفايات الاشعاعية في صناعة النفط والغاز

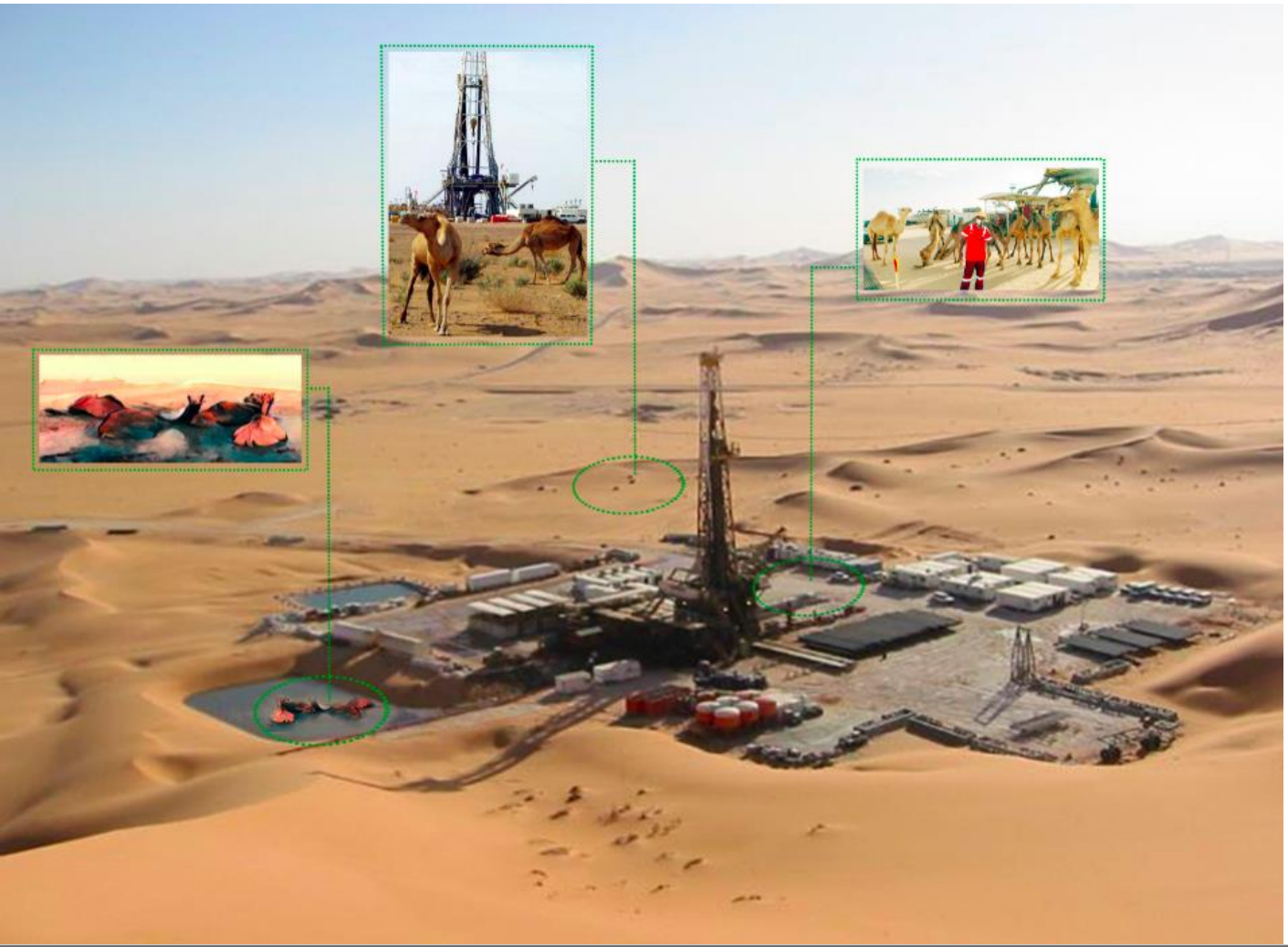
سديم SADEEM

الهيئة العربية للطاقة الذرية

المواد الاشعاعية في قصاصات الحفر

SADEEM
الهيئة العربية للطاقة الذرية

مخاطر مرادم النفايات الاشعاعية السطحية



SPE 71434

Chevron Safely Disposes One Million Barrels of NORM in Louisiana Through Slurry Fracture Injection

A.C. Reed, SPE, Terralog Technologies Inc., J.L. Mathews, SPE, Chevron USA Inc., M.S. Bruno, SPE, and S.E. Olmstead, Terralog Technologies Inc.,

Abstract

During the past 50 years, storage pits and adjacent land around the Bay Marchand facility near Port Fourchon, Louisiana, had accumulated large deposits of non-hazardous drilling and production waste containing naturally occurring radioactive material (NORM). This material primarily included drill cuttings, drilling mud, produced sand, saltwater, pipe scale, crude oil and precipitates. To remediate this site, Chevron chose to re-inject the material into the deep subsurface through on-site Slurry Fracture Injection (SFI). This process provided greater environmental security than alternative surface pit or landfill disposal, and at much lower cost than off-site transport and disposal options.

More than 1 million barrels of pit soil and canal bottoms was safely disposed into a single well during two years of injection concluding in March 2000. Solid waste was mixed with water to create a slurry and injected down-hole above formation parting pressure into a weakly consolidated sandstone formation at depths from 4400 to 5000 feet. Injection operations were episodic, generally taking place for 11 hours per day, 5 days per week. This allowed formation pressure to decline each day to initial reservoir pressure. The project was designed and extensively monitored to maintain and verify containment within the permitted interval. Down-hole pressure was continuously monitored, allowing analysis of daily fall-off pressure. Waste containment was confirmed through a combination of shut-in pressure analysis, periodic step-rate tests, and periodic gamma logs and temperature surveys.

In addition to improved environmental protection provided by this technology, the on-site operation was a fraction of off-site disposal costs to Chevron. This paper describes the project design and permitting, injection operations, containment monitoring and analysis, and project economics.

Introduction

The Bay Marchand oil field is located just offshore of southern Louisiana. The field began production in 1949 and has been operated by Chevron for most of its life. Oil production came onshore at the Bay Marchand Terminal in Port Fourchon (Figure 1). Oil production was processed through a series of pits into the 1980's to separate water and other materials from the oil. Over time the pits accumulated drill cuttings, drilling mud, produced sand, salt water, pipe scale, crude oils and precipitates, all of which contained small amounts of naturally occurring radioactive material (NORM)[1,2]. The elements of concern were uranium-238, thorium-234 and radium-228.

The three processing pits were located at the east end of the California Canal (Figure 2). These pits were hydraulically isolated, which prevented any radioactive materials from leaching into the adjacent canal, particularly radium which is very soluble in salt water. To the southeast the Dead End Canal also contained substantial quantities of NORM and NOW (non-hazardous oilfield waste) mixed into canal bottom soils. This contamination was primarily due to overflows from discharge and processing pits at the material handling facility located adjacent to the canal.

The remediation project was composed of two phases: excavate and backfill the Bay Marchand pits, and remediate the bottom of the Dead End Canal. The Bay Marchand pits were excavated between October 1997 and September 1998 with the material injected into disposal well City of New Orleans #2 (CNO#2) using the Slurry Fracture Injection (SFI) process. The Dead End Canal was drained and excavated from February 1999 to March 2000. The canal bottom was excavated to an average depth of 6 ft, to a maximum of 12 ft in any given area. A total of 371,600 bbls of material were excavated from the Bay Marchand Pits, and 623,100 bbls of canal bottoms were excavated from the Dead End Canal.

التخلص من النفايات الاشعاعية في التكوينات الجيولوجية او لاعمال التكسير الهيدروليكي

التقييم الكمي والنمذجة الديناميكية لمخاطر المواد الاشعاعية في صناعة النفط والغاز

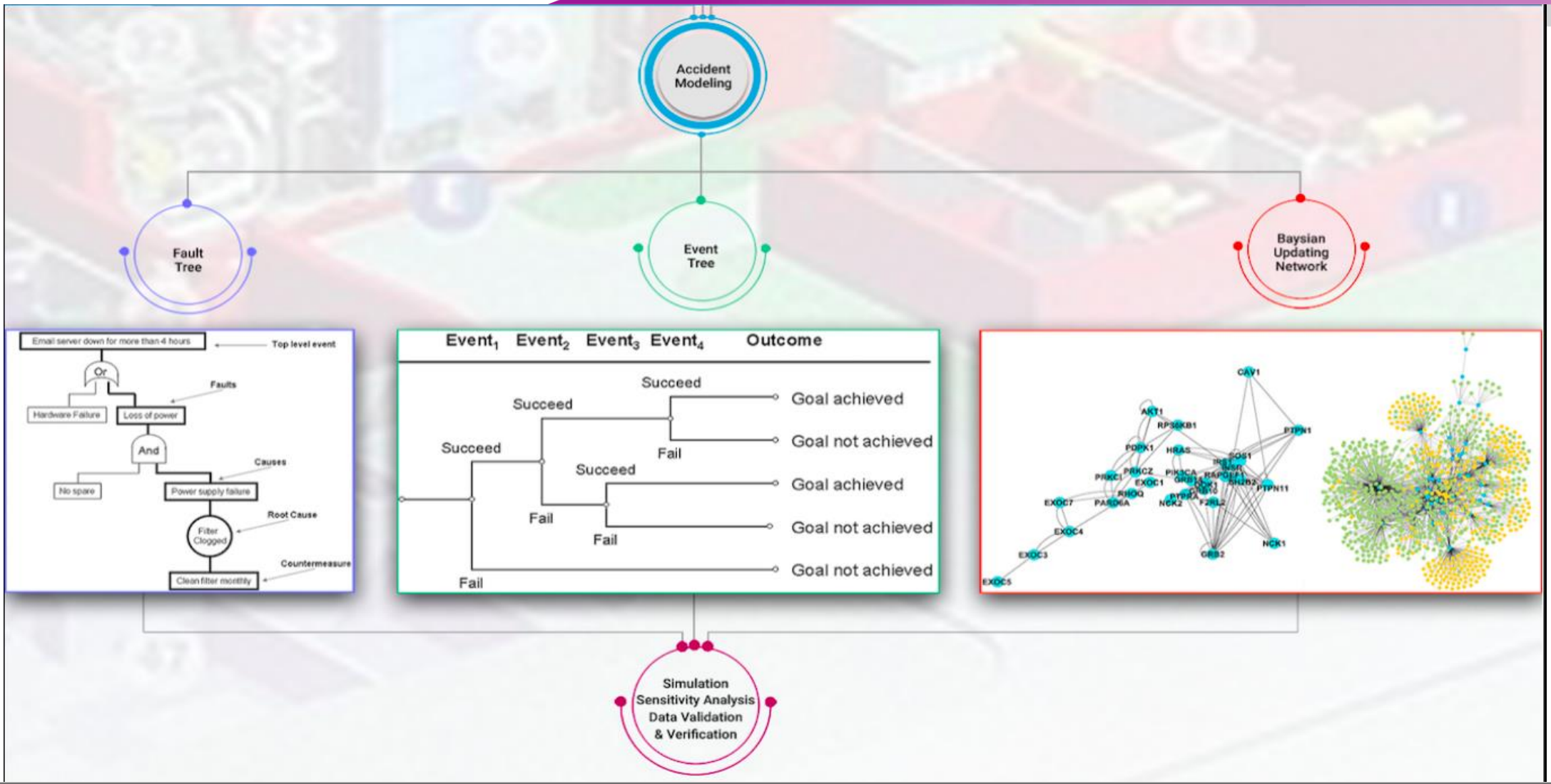
سديم SADEEM

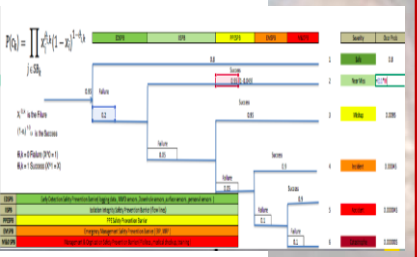
الهيئة العربية للطاقة الذرية

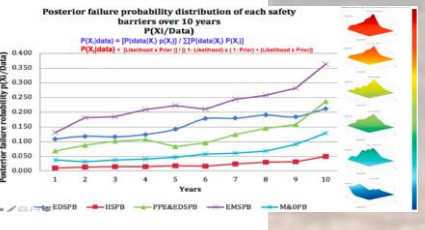
تصنيف المخاطر

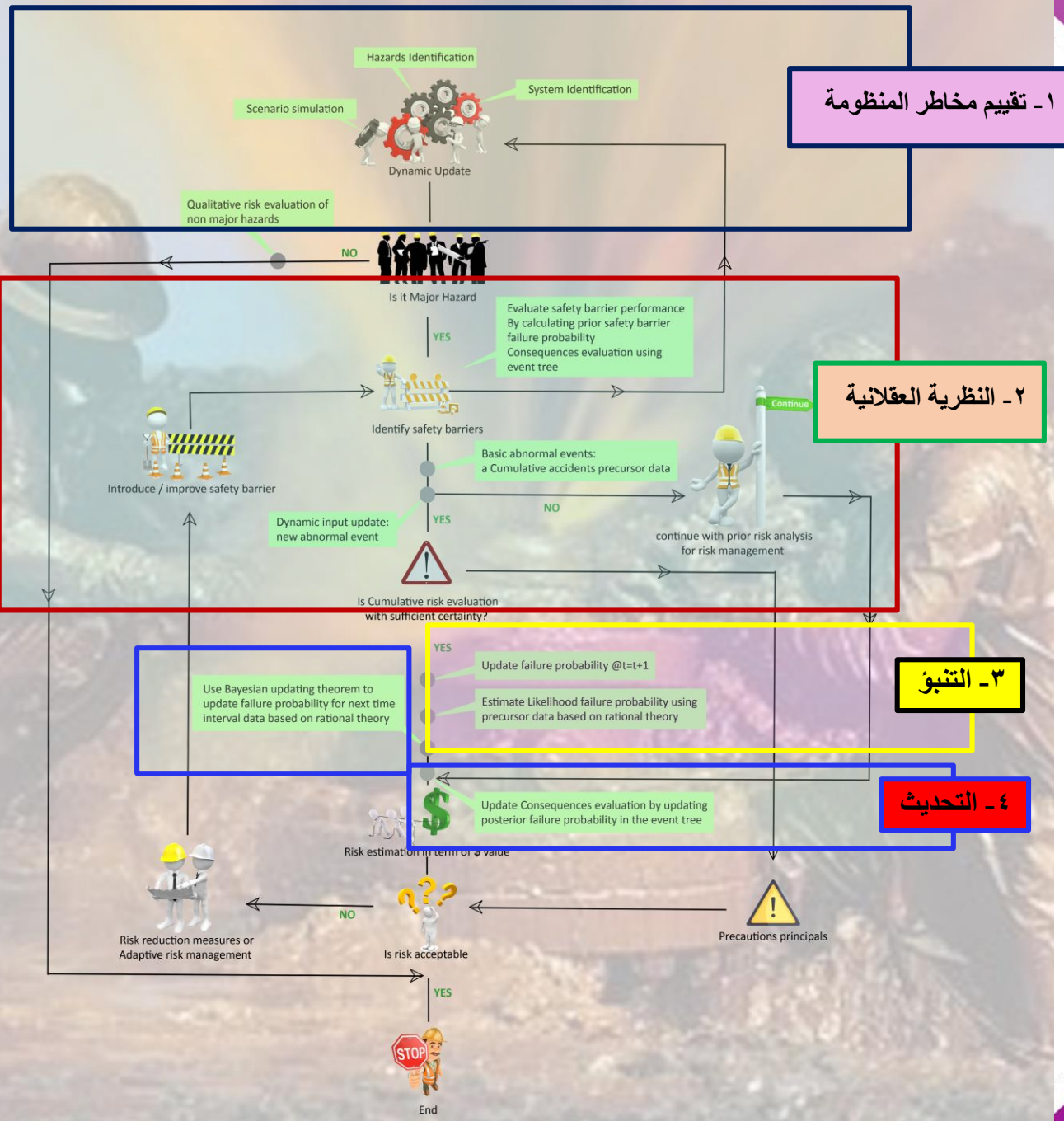
تقييم المخاطر

نمذجة الحوادث









١ـ تقييم مخاطر المنظومة

٢ـ النظرية العقلانية

٣ـ التنبؤ

٤ـ التحديث

منهجية سمارت للتقييم الكمي والنمذجة الديناميكية

سديم SADEEM

الهيئة العربية للطاقة الذرية

THANK YOU FOR YOUR ATTENTION

الهيئة العربية للطاقة الذرية

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