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# **Understanding of elemental migration properties in geological environment**

## **-A case of low permeability unconsolidated clayey sedimentary layer-**

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### **Abstract**

Understanding of elemental migration in sedimentary strata is a critical issue to clarify for the long-term safe utility of deep underground environments e.g. CO<sub>2</sub> storage, LPG (Liquefied Petroleum Gas) storage and Nuclear Wastes Disposal as well as for the remediation of polluted subsurface rocks and sediments. In the consolidated hard rocks, behavior of elemental migration can be controlled mainly by distinguishable geological structures relevant to groundwater flow such as faults and fracture(s) network and by the surrounded hydraulic potentials. In order to elucidate the role of these features, many kinds of in-situ and laboratory experiments with numerical modeling studies have been applied. On the other hand, for the unconsolidated sediments, it is however little known the major feature to control the elemental migration due to undistinguishable complex heterogeneity of physical properties influencing groundwater permeability and chemical characteristics of composed minerals that affect on the chemical retardation such as sorption capacity. Here, as an example, it is therefore focusing on the characterizing methodology of elemental migration behavior in unconsolidated clayey sediments in order to enforce the further studies and developments necessary to provide confidence for the future safe utility of underground environments as well as for the urgent issues of geo-pollution facing in our society.

**Keyword:** Elemental migration, Geological environment, Unconsolidated clayey sediments

# **Distribution of “Uwagasu”, Spouting Natural Gas, in Kujuukuri Plain, Boso Peninsula, Central Japan**

## **– Geo-environmental Survey for Uwagasu –**

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### **Abstract**

The Kanto sedimentary basin occurred in Green Tuff movement at the Miocene and developed in Island Arc movement since the Pliocene. In this sedimentary basin, It consists of Miura Group, Kazusa Group, Shimosa Group, Kanto loam formation, Alluvial formation and Artificial formations in ascending order. Methane is included in Miura Group, deposited from the Miocene to the early Pleistocene, and Kazusa Group, deposited from the late Pliocene to the early Pleistocene. These Groups accumulated mainly in deep sea.

Large quantity of high purity methane is included particularly in groundwater and strata of Kazusa Group. Kazusa Group distributes in subsurface in central part of Boso Peninsula. The natural gas which spouts up into the air, is used for house fuel since late Edo era in Otaki Town, eastern Kazusa region. The natural gas has been called “Uwagasu” there. On this account, large quantity of watersorbable natural gas has been taken by deep wells in southern part of eastern Kazusa region after the World War II. In central part of Kujuukuri region the watersorbable natural gas has been pumped up recently, too. Distribution of the “Uwagasu” increases in central part of the Kujuukuri region. The crops have die at the sites where the “Uwagasu” blowing off. In addition, a gas explosion was generated in Iwashi Museum, museum for sardine, in Kujuukuri Town in summer, 2004. On this account, distribution of the Uwagasu was surveyed in central part of the Kujuukuri region. The result is as follows.

A great deal of the Uwagasu is observed from Fukutawara, eastern part of Togane City, to Seinagoya, eastern

part of Oami-Shirasato Town. Methane gas of several cube meters per second spouts out in the irrigation ditch in the “Area I” of Fukutawara - Seinagoya district. In addition, the “Uwagasu” spouting zones extend to the west-northwest direction along Kita-Goya river. In Kujoyukuri district, several Uwagasu zones extend to north-northeast direction. The largest zone, from Shinsei to Suijinyama through Katakai, is 4 km in length and 0.2 – 0.5 km in width. The Iwashi Museum is in this zone. The crops often die at the Uwa-gasu.

In the future it is necessary to examine the change of location and the quantity of spouting gas of the “Uwagasu” every year. Further the mechanism of the “Uwagasu” must be going to be probed in each site. Accordingly the “Uwagasu” will be used effectively and safely. These information is important for urban planning.

**Key Words:** Uwagasu, Natural Gas, Kujoyukuri Plain