



## Exploration and first assessment of suspicious areas in Styria 1997

<b>Contractor:</b>	Joanneum Research, Institute for Environmental Geology and Eco-System Research
<b>Customer:</b>	Styrian Provincial Government - Specialised Division 1c
<b>Participants:</b>	Institute for Building Biology
<b>Date of Publication:</b>	October 1997

### 1. Summary

By means of two assessment models, suspicious areas were studied and assessed as to abandoned landfills and old sites in parts of the following Styrian communes: Graz; Environs of Graz: Thal, Judendorf-Straßengel, Gratkorn, Stattegg, Weinitzen. "Old sites" were not considered in the present project. The project was handled by the "Institut für Umweltgeologie und Ökosystemforschung" ("Institute for Environmental Geology and Eco-System Research").



### 2. Starting Position

The project "Erkundung von Verdachtsflächen auf Altablagerungen und Altstandorte in der Steiermark" ("Exploration of Suspicious Areas for Old Deposits and Old Sites in Styria") was jointly executed by the Federal and Provincial Authorities in the field of raw material, energy and environmental research



### 3. Goals

- The project was aimed at principally investigating and acquiring suspicious areas in Graz-City and Graz-Environs, their first estimate by means of the IT-system "Altrisk" ("Old Risk") as well as the generation of interfaces to "GIS Steiermark". For this application, the IT-programme, which was developed at the "Freie Universität Berlin" ("Free University Berlin"), had to be adapted to Styrian conditions.



### 4. Procedure

- In the course of periodical evaluations of aerial views, all areas that hinted at artificial interventions or putting waste on the landfill because of the identifiable morphological conditions or because of differences in colour and grey scale were identified.
- After the evaluation of the photos and during this evaluation, the investigations into history and site visits were made. Literature and official sources were processed and research was done in the communes or in the course of the site visits at neighbours' or companies' sites.
- These results are, on the one hand, documented in an analog way in the form of forms for evaluating aerial photos and, on the other hand, as a transparent layer explaining the individual sheets of the Aerial Photo Map 1:10000.
- Polygonal evaluations of the individual volumes of aerial photos were also processed in a digital way by means of ARC/INFO. In addition, a data base of the suspicious areas was created in ARC/INFO.
- Furthermore, a separate text data base was created for the suspicious areas.

- The first assessment of the potential of risk in connection with the suspicious areas was made in an analog way according to the Baden-Württemberg Model.
- In addition, the expert system ALTRISK was adapted to Austrian conditions and the first assessment of the suspicious areas found by using this computer programme.
- The efficiency and flexibility of the ALTRISK Programme were tested.
- The assessment results gained by using the Baden-Württemberg Model and ALTRISK were compared and discussed.

Interactive inquiry options in the data base:

The data acquired in ARC/INFO can be displayed on the screen easily and rapidly by means of the visualisation software ARC/VIEW. By using the mouse, any areas can be enlarged, single thematic levels, (e. g. aerial photos of different years), can be switched in or out so that the changes in the course of time are documented. Additional information on the size, depth and type of waste put on the landfill can be clicked on. Logical inquiries will, e. g., help to determine all the suspicious areas that exceed a certain depth so that they have a "wet foot".

Graphic representation:

Areas in which waste put on the landfill could be detected were marked. The colour of the marking is determined by the moment waste was demonstrably put on the landfill for the first time. Areas in which putting waste on the landfill has been stopped are also marked separately.

Contents of the Assessment Systems Baden-Württemberg (BWM) and ALTRISK:

The assessment of abandoned polluted areas and suspicious areas according to BWM comprises identifying, acquiring and describing a site liable to risk. The goal is to estimate the risk caused by the studied area and to fix the required action. Furthermore, an estimate of what action should be prioritised is to be possible. The evaluation is to be transparent and traceable and should make it possible to incorporate findings from other special fields. The assessment system is to make it quite easy to integrate new facts found in further studies into the existing data base. In order to simplify the situation of studying abandoned polluted areas, which mostly is quite complex, and to create the basic conditions mentioned above, it is recommended to consider the different items to be protected, i. e. soil, groundwater, surface water and air, separately. If several goods to be protected are affected by one abandoned polluted area, the items to be protected are to be classified and the need for action is to be discussed.

The structure and configuration of the assessment model are based upon comparable experience and examples of known abandoned polluted areas. This makes it easier to estimate action to be taken most urgently and prioritising.

ALTRISK has been developed for different groups of users. It also considers users that only have moderate or even low technical knowledge. This applies to the area of ecologically relevant questions and to the geological aspects of an assessment of suspicious areas. The user's previous knowledge influences the course and the contents of the programme and the degree of reliability calculated by the programme. ALTRISK serves for the first assessment of a suspicious area or an abandoned polluted area. It allows to assess the load path of groundwater with a first estimate of maximal damage to the groundwater. Notwithstanding this, it is possible to assess if the use of the respective groundwater may put people and material at risk. The assessment stages in ALTRISK are subdivided into three information levels or four modules and also allow a single assessment of site factors or of factors for the selection of the site. Besides the first assessment of the potential of risk, particular importance is attached to estimating the reliability of the results. Determining a measure of reliability is a partial result of ALTRISK assessment. Toxicity, penetration of gravitational water and the passage through the unsaturated zone are used as factors relevant for the potential of risk for groundwater. ALTRISK has been designed for assessing dumping landfills or for estimating the potential of risk for groundwater. An assessment of the paths soil, surface water and air is not provided for. Assessment is oriented towards groundwater, which is a good to be protected whose maximal size of damage is estimated and stated in numerical risk values.



## 5. Result / Benefits

The following areas were selected as areas to be tracked or to be assessed for their potential of risk:

- Areas indicating landfill material of any kind in the aerial photos
- Areas on which deposits have become known because of other surveys
- Areas on which the site visit has given the impression that the fact that waste has been put on the landfill cannot be excluded even though waste put on the landfill need not be expected when looking at the aerial photos or considering historical surveys
- Areas that have already been recorded in the "Verdachtsflächenkataster der Steiermärkischen

Landesregierung" ("Cadastral Map relating to Suspicious Areas prepared the Styrian Provincial Government").

