Detailed description of activities, coherent with the proposed objectives

Activities and time schedule of BIOMEG project are indicated in *Annex 1.7. Plan of the project (PR 06).* Details of the most important activities are presented next:

Step I. ESTABLISHING OF ORGANIZING AND METHODOLOGICAL FRAME OF THE PROJECT

Activity I.1. Experimental and operational protocol processing by correlation of partners' activities in order to reach the project objectives (*UBM, SCDAL, UO, UTBv*) - the goal is meeting at Baia Mare of consortium's partners to recognize the particularities of studied area and common agreeing the project' s evolution.

Activity I.2. Synthesis and analysis of bibliographic data in the field of pathways and bioaccumulation mechanisms in different types of vegetables (*UBM, SCDAL, UO, UTBv)* - bibliographic sources: books, journals, national and international databases; aspects regarding the chain: bioavailability, toxicity, risk in ecosystems, case study, will be utilized.

Activity I.3. Equipment and material acquisition (*UBM, SCDAL, UO, UTBv*): involve the equipments, the reagents and the material required by the future research activities.

Activity I.4. Create the web page and reporting documents for Step I *(UBM, SCDAL, UO, UTBv).*

Step II. DESIGNING OF DISPERSION CHARTS OF HEAVY METALS CONTENT IN SOIL AND SELECTION OF WORKING AREAS

Activity II.1. Heavy metals pollution's history of studied area *(UBM)* will present the geographical location, geologically, chemically and pedologically climate characterization, type and time evolution of industrial activities in studied area.

Activity II.2. Identification, location and presentation of actual main pollutant sources in Baia Mare (*UBM*): will be identified and characterized the main heavy metals pollutant sources in area (location, type

of products, technologies, disposal of industrial wastes, sedimentation ponds, ecological accident occurred).

Activity II.3. Meteorological factors specific in the area (thermal and pluviometric conditions, predominant winds, thermal inversion) *(UBM, SCDAL)*: will be identified in order to discuss the dispersion of the pollutant.

Activity II.4. Designing of sampling network connected with location of pollutant sources (*UBM*): central points of sampling network will be represented by the main pollutant sources and it will be developed thus to include and un-polluted areas. Sampling directions will be also settled and along of each direction a number of samples large enough to assure the accuracy of results will be collected.

Activity II.5. Soil sampling for analysis (*UBM, SCDAL, UO)*: soil samples from surface and 30 cm in depth will be packed, marked and transported to laboratories for physical, chemical and microbiologically analysis; foe each soil sample, GPS geographical coordinates will be recorded.

Activity II.6. Microbiologically (soil's microbiota) physically and chemical (AAS) analysis of soil samples (texture, structure, grading analysis, specific density, hydro physics indicators) and chemically (pH, humic acids, SB (total basis), Ah (hydrolytic acidity), T (ionic exchange capacity), V (saturation level in basis) redox potential, total content of: N, P, K and heavy metals and speciation of heavy metals content and heavy metals charts will be designed (*UBM, SCDAL, UO*): heavy metals levels and geographical coordinates will be correlated in dispersion charts for both surface and 30 cm in depth; charts analysis will include soil characteristics and meteorological factors.

Activity II.7. Selection of agricultural areas with different heavy metals contamination level for study of pathways and bioaccumulation mechanism of heavy metals in vegetables (*UBM, SCDAL, UO*): based on dispersion chart analysis and meteorological factors, three types of areas: maximum level of pollution, average level of pollution and non-polluted will be consider for growing of vegetables and study of pathways and bioaccumulation mechanism of heavy metals.

Activity II.8. Material acquisition (*UBM, SCDAL, UO*) .

Activity II.9. Making actual the web page and reporting documents for Step II (*UBM,SCDAL, UO*) .

Step III. SAMPLING OF SOIL AND VEGETABLES, PHYSICALY-CHEMICALLY-BIOLOGICALLY ANALYSIS, CREATING OF INFORMATIZED DATABASE WITH FIELD OBTAINED RESULTS

Activity III.1. Preparation of working area (*UBM, SCDAL, UO*) include the activities:
Preparation of parcels which will represent the working area. The study will take place simultaneous on the 4 parcels. On tree of them will be added the zeolit and on the fourth parcel the soil doesn't be remediate with zeolit.
Preparation of zeolits involves the grinding of the zeolits in according with the grading analysis of the soil (at the same grading analysis or the very close grading analysis such as soil).
Selection and sowing the vegetable species.

Activity III.2. Sampling of soil and vegetables along of vegetative periods (*UBM, SCDAL, UO*): during the vegetative cycles will be collected different parts of vegetables (roots, leaves, etc.) and also soil on which the vegetables are cultivated.

Activity III.3. Microbiologically, physically and chemically analysis of soil samples and vegetables cultivated on selected (working) area (*UBM, SCDAL, UO*): physically analysis of soil samples (texture, structure, grading analysis, specific density, hydro physics indicators), chemically (pH, humic acids, SB (total basis), Ah (hydrolytic acidity), T (ionic exchange capacity), V (saturation level in basis) redox potential, total content of: N, P, K, heavy metals and speciation of heavy metals content, and microbiologically analysis (soil microbiota) will be performed for identification and explanation of easily bio-available chemical combination presence in soil; the heavy metals' level will be determined from the collected vegetable samples; special attention will be given to the organoleptic qualities: necrosis, characteristic diseases, texture, taste, smell.

Activity III.4. Assessment of elements which could significantly influence the level of pollutant in the studied area (*UBM, SCDAL, UO*):

Describing the region from a thermal point of view (annual regime, extreme temperatures, geographical differences; identification and evaluation of thermal risks based on quantitative factors; temperature variability and their tendency of evolution, at medium and extreme values; identification of the relation between the physical-geographical conditions and the air temperature.
Describing the region from a pluviometric point of view (annual regime, extreme quantities in different temperature levels, possibility of quantity production on some levels, geographical differences); identification and assessment of pluviometric rocks based on quantitative factors; precipitation variability and their tendency of evolution, at medium and extreme values; identification of the local physical-geographical conditions and precipitation.
Determining the sedimentation powders in the working areas and their content in heavy metals, based on the CORINAR and AP-42 emission coefficients.

Activity III.5. Estimate the efficiency of used zeolit to reduce of heavy metals level soils. Technical and economical aspects (*UBM, SCDAL, UO*): determination of optimal proportion between soil and zeolit; determination of time for maximum loading of zeolit.

Activity III.6. Material acquisition (*UBM, SCDAL, UO*).

Activity III.7. Making actual the web page and reporting documents for Step III (*UBM, SCDAL, UO).*

Step IV. MATEMATICAL MODELLLING OF THE POLLUTANTS' DISPERSION IN THE SOIL, DETERMINING THE BIOACCUMULATION MECHANISMS OF HEAVY METALS IN VEGETABLES

Activity IV.1. Determining the correlations between the physical-chemical parameters of the soil and speciation of heavy metal in soil (*UBM, SCDAL, UO*) for estimating the light bioaccumulative fraction.

Activity IV.2. Determining the correlation between the soil's contamination level, bio-availability of the heavy metals in soil and the vegetables' contamination level. Identification of the agricultural species with high risk regarding bioaccumulation (*UBM, SCDAL, UO*): the comparative analysis of the heavy metals' level in soil samples and in

vegetables samples collected from these regions, for emphasis on the selectivity in bioaccumulation of heavy metals in each type of vegetables, and in those parts of the plants that accumulate mainly heavy metals.

Activity IV.3. Determining the pathways and mechanisms of heavy metals bioaccumulation in the analyzed vegetables (*UBM, SCDAL, UO*) aspects regarding the transportation of heavy metals from soil in plant (actions of the rhizosphere) will be presented, the plant's physiological processes that influence bio-availability, the action of those enzymes that assure the heavy metals' transition through the cell membrane of plant, the relation between bio-availability, toxicity-risk in the ecosystem, parameters that essentially influence the bioaccumulation mechanisms.

Activity IV.4. Material acquisition (*UBM, SCDAL, UO*).

Activity IV.5. Making actual the web page and reporting documents for Step IV (*UBM, SCDAL, UO).*

Step V. INFLUENCE OF HEAVY METALS ON CHILDREN'S HEALTH ESTATE ON THEIR FORMATIVEE PERFORMANTS

Activity V.1. Presentation of microelements' level required by the human's organism and their role (*UBM, UO, UTBv*) the role of these microelements in harmoniously growth of organism and health's keeping up.

Activity V.2. The selection of target group and their testing (*UBM, UTBV*) It will be selected the children between 3-14 years old from two zones (one contaminated zone – Ferneziu, and one uncontaminated zone as standard zone – Calinesti, both from Maramures county). There wasn't any other similarly study in Baia Mare (Ferneziu is a district of Baia Mare town), or in Maramures county (Calinesti is a village at ~60 kilometers distance from Baia Mare). The estimated weigh of target group is 150-200 childrens. For 3-7 years old category of children it will be applied the Nepsy test package which includes 27 tests for sense perception and motive functions, attention, executory function, language, memory, and learning. For 7-14 years old category of children it will be applied the BTPAC test package which will test the natural disposition for appearance's perception, spatial orientation, general learning, mathematics, reaction's quickness.

Activity V.3. Establish the indicator's level of pollution in worked area (heavy metals concentrations) (*UBM, UTBv*). It will be analyzed the heavy metals concentrations in the water and in the air of worked area. This results it will be correlated with the medical results obtained in the next activity (V.4), which will take place in the same time with this activity.

Activity V.4. Taking into account the type (category) of diseases and their frequency of appearance at target group (*UBM, UTBv*). It will be having in view the medical historic of target group. With a view to estimate de actual contamination with heavy metals of children, it will be analyzed their hair and blood samples.

Activity V.5. Framework of data bases from obtained informations, processing of medical dates and expounding of them, correlation between this dates with zonal pollutant level (*UNBM, UTBv*). For expounding the dates, it will be used ANOVA statistics procedure, both to the formative performance resultants and health estates results.

Activity V.6. Establish the level of European low implementation in Romania.

Activity V.7. Material acquisition (*UBM, UO, UTBv*).

Activity V.8. Making actual the web page and reporting documents for Step V (*UBM, UO, UTBv*).

Step VI. DISSEMINATION ACTIONS OF THE PROJECT'S RESULTS

Activity VI.1.The permanent updating of the project's web page presenting the results and the conclusions (*UBM*) resulted from the study regarding the determining of the actual pollution level and of the bioaccumulation of heavy metals in vegetables.

Activity VI.2. Presenting the project's results on CD *(UBM, SCDAL, UO, UTBv)* which will be disseminated, together with other materials such as booklet and folders, at conferences, symposiums, work-shops.

Activity VI.3. Organizing a workshop (*UBM, SCDAL, UO, UTBv*): it will be held at Baia Mare in July 2011 and it will include the project's domain (heavy metal pollution, the accumulation of heavy metals in the food chain, food safety, the legislation in the field of food safety).

Activity VI.4. Publishing the results in ISI quoted/indexed journals/prestigious databases (*UBM, SCDAL, UO, UTBv).*

Activity VI.5. Material acquisition *(UBM, SCDAL, UO, UTBv).*

Activity VI.6. Reporting documents for step VI and for the final report *(UBM, SCDAL, UO, UTBv).*