Filipopolis KCM Environmental Due Diligence
Baseline Community Health Analysis

Non-Technical Summary

August 2010

NEWFIELDS

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INTRODUCTION

This report presents a non-technical summary of the key community health issues associated with the proposed long-term European Bank for Reconstruction and Development (EBRD) loan for production/environmental upgrades to the Filipopolis KCM Smelter:

- Rationale of the KCM Project
- International perspective on community issues related to lead smelters
- Overview of the environmental data associated with the KCM Smelter
- Overview of the available blood lead data for nearby communities
- NewFields analysis and summary of potential community health impacts from the KCM smelter
- Proactive management

RATIONALE

The EBRD is considering providing a long-term loan of €47 million to support KCM, a leading Bulgarian lead and zinc smelter, in implementing a complete reconstruction and modernization of the lead production line and selected upgrades to the zinc process. This effort represents Phase 1 of a comprehensive 2-stage modernization program of the Company's operations. Previously, a major production/environmental upgrade was financed by the Japan Bank for International Cooperation (JBIC) in 2000-2001. This upgrade had significant and positive impacts on environmental performance with likely beneficial community health effects.

KCM has an active community social engagement program and generally proactive environmental management system. The EBRD environmental analysis of the proposed project concluded that the project has been developed in accordance with 'Best Available technology (BAT) and will help the plant achieve further reductions in air emissions which will allow compliance with pertinent European Union (EU) regulations. The significant environmental improvements which are expected from this investment in turn have important and long-term beneficial community health impacts.

This non-technical summary describes the potential community health impacts of the proposed EBRD investment at KCM S.A.

INTERNATIONAL PERSPECTIVE LEAD SMELTERS

Community exposure to lead is largely related to industrialization. Globally, the processing of lead ores is estimated to have released approximately 300 million tons of lead into the environment. The overwhelming majority of the released lead is post-industrial revolution related. During the 20th century there was a substantial increase in community environmental lead contamination related to the use of lead in petrol. Large lead mining and smelting operations have had an extremely complex environmental history and there are numerous negative human health and environmental legacy issues associated with these facilities. Hence, while there have been significant environmental and human health improvements in the current performance of lead mining/smelting operations, it is not surprising that primary lead smelting attracts significant scrutiny and concern from community stakeholders. The KCM facility is not an exception to this observation.

Internationally, there is a significant environmental and community health legacy associated with primary lead smelters; therefore, stakeholder concern should be expected and appropriately addressed.

From a human health perspective, the blood lead level (BLL) is the standard measurement of exposure that is utilized for assessing potential impacts from lead emissions. BLLs are evaluated at an individual and a population (community) level. The BLL is considered to be a useful measure of integrated exposure, *i.e.*, the measured level in blood is derived from all sources, such as air, food, water, soil/dust, etc. The BLL is commonly reported in units of micrograms per deciliters (µg/dL) or in micromoles per liter (µmol/L). There are approximately 20.8 µg/dL for each µmol/L.

The blood lead level (BLL) is the standard measure of integrated exposure. BLLs are considered at both an individual and population level.

The typical central tendency measure of population (community) BLL is the geometric mean, i.e., the best measure that reflects the community exposure to all lead sources. However, this "best measure" must be carefully evaluated as a single number does not always accurately reflect the 'true" underlying community situation. BLLs vary significantly as a function of age and generally peak at 36 months of age. A group of 6-8 year olds is much more likely to have a lower BLL mean than a set of 2-3 year olds given the same basic level of exposure. When comparing BLLs particular care must be paid to the age distribution of the children who were in the survey. Therefore, it is usually best to present the BLL data in specific narrow age groupings rather than across a broad age range. Lead can also be measured in bone using specialized equipment.

The BLL must be carefully considered within specific age ranges. A three year old is not the same as a seven year old.

Not surprisingly, the measured blood lead levels in humans have dramatically changed related to the widespread processing and use of lead. For example, lead levels in human skeletal remains indicate that the body lead burden of today's populations is 500–1000 times greater than that of their pre-industrial counterparts (Tong, 2000). There are similar orders of magnitude differences between the measured blood lead levels of people in remote regions of the southern and northern hemispheres and the current levels of concern, **10 µg/dL**, established by regulatory and public health authorities worldwide.

Internationally, the standard BLL threshold level of concern is 10 ug/dL.

Population BLLs are invariably higher in locations where leaded petrol is common. In addition, community BLLs tend to be higher in those communities geographically adjacent to industrial sources that release lead into the general environment. The combination of leaded petrol and close proximity to an industrial emission source(s) consistently produces elevations of BLLs in young children. Young children (especially between the ages of 12-84 months) are the primary receptors of concern. The potential for adverse effects of lead exposure in children is a significant focus because:

– Intake of lead per unit body weight is higher for children than for adults

– Young children often place objects in their mouths, resulting in dust and soil being ingested and, possibly, an increased intake of lead

– Physiological uptake rates of lead in children are higher than those in adults

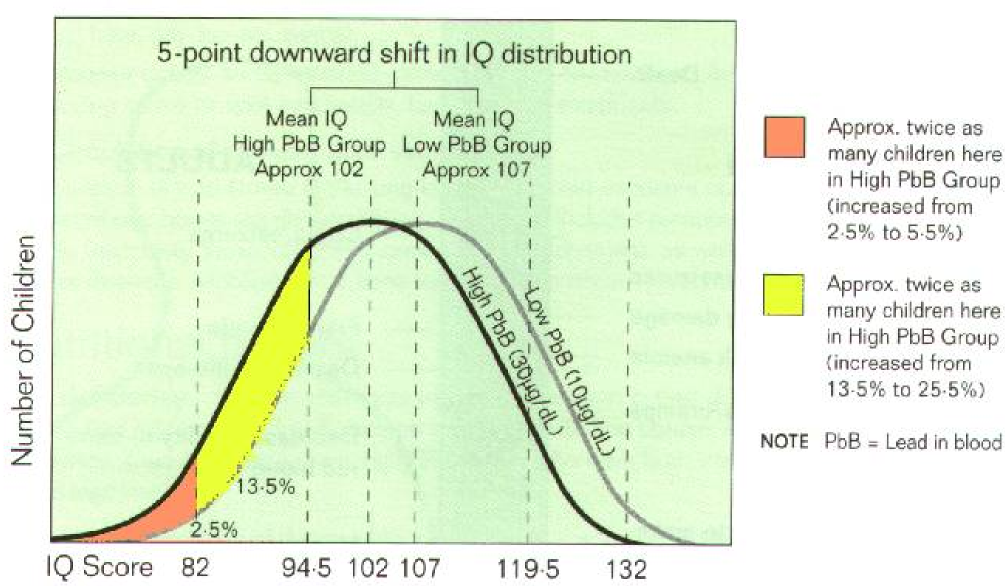
– Young children are undergoing rapid development, their systems are not fully developed, and consequently they are more vulnerable than adults to the effects of lead (Tong, 2000).

For lead exposures, young children ages 1-7 years are the primary focus of concern.

There is debate regarding the actual human health impact of low-level lead exposures. However, the accumulated epidemiological evidence indicates that low-level exposure in early childhood causes an adverse *population-level* impact in cognitive development. Low-level lead studies are difficult to perform and have typically been discrete snapshots in time (cross-sectional design), *i.e.*, exposures and outcomes are measured at approximately the same time. A single measurement of exposure, such as the BLL, provides objective but limited information in terms of answering questions related to the natural history of the association between lead exposure and a specific outcome, *e.g.*, change in cognitive performance. Many published studies have failed to control for the effects of key confounding factors, *e.g.* parental intelligence, socioeconomic status, and quality of the home environment. These "confounders" can overwhelm the subtle endpoints under consideration.

More recent prospective studies have used highly sophisticated designs to examine the relationship between antenatal and postnatal blood lead levels on childhood development. These studies have been performed at a variety of settings including large mining/smelting sites, *e.g.* Port Pirie, Australia. Children have been followed up prospectively from birth in order to study the relationship between exposure and a suite of specific outcomes. For blood lead levels < 30 mg/dl it appears that the size of the effect on cognitive development (IQ), as assessed at 3 years of age and above, is probably 1–3 points for each 10-mg/dl increment in blood lead level, with no definitive evidence of a threshold. This concept is illustrated below which uses the previously mentioned 10 ug/dL standard.

Blood Lead and Population IQ



Source: Based on data from Agency for Toxic Substances and Disease Registry (ATSDR), 2007

This figure illustrates an important but subtle finding, *i.e.*, the observation is made on a **population level**. On an **individual level**, it is practically impossible to attribute a small change in IQ performance to a specific exposure as many of the key confounding issues, *e.g.*, parental intelligence, socioeconomic status, and quality of the home environment, will overwhelm the effects of low-level lead exposure.

Subtle effects of low-level lead exposure may be important at a population level but very difficult to assess at an individual level.

Low-level environmental exposure to lead comes from diverse sources including petrol, industrial processes, paint, solder in canned foods, water pipes and pathways (air, household dust, street dirt, soil, water, food). Evaluation of the relative contributions of these sources and pathways is extremely complex. There are relationships between the concentration of lead in a given media, *e.g*., air, water, soil, food and the measured BLL.

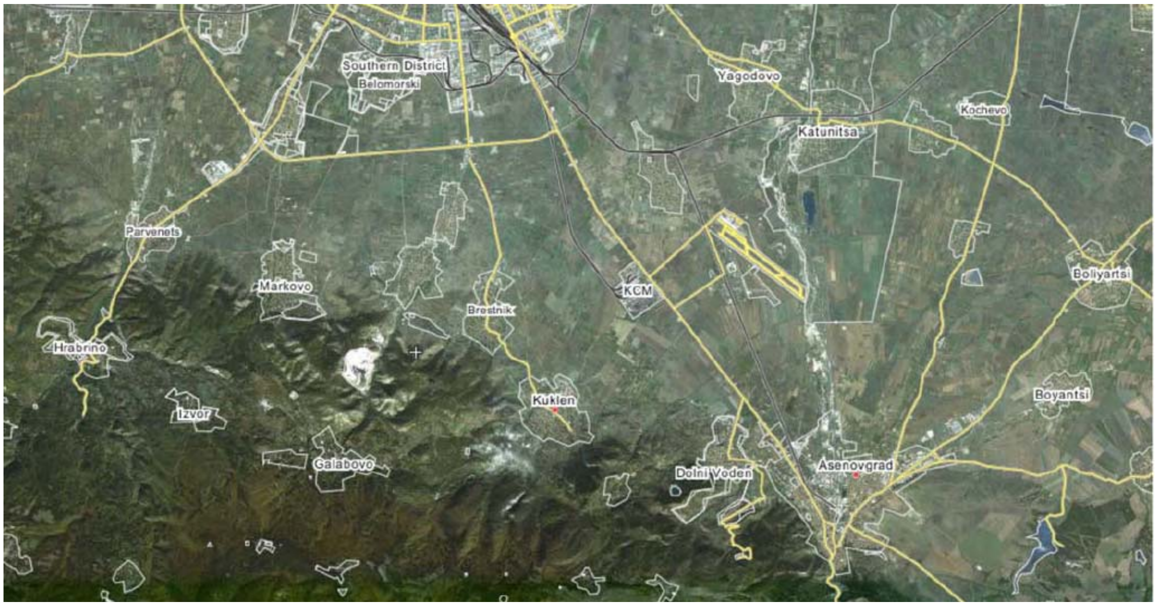
The measured BLL level is a snapshot in time that represents an "integration" of all of the environmental exposures sources. The measured BLL does not stay static but changes over time as a function of individual behaviors, changes in body weights, time of year (summer versus winter) and environmental media concentrations. For example, as children become older, the amount of hand-to-mouth behavior declines so that the importance of the indoor dust pathway decreases.

Over the last several decades, substantial declines in the average BLL have been documented across the USA, Canada, Australia and Europe. These changes are related to removal of lead from petrol and a significant movement of primary lead mining and smelting activities from developed countries to newly industrialized nations. In Eastern Europe, there has been longstanding industrialization and significant continuous mining/smelting activity; hence, it would not be surprising to find significant geographical areas where BLLs are elevated versus Western Europe. However, the removal of lead from petrol across Eastern European nations will push national BLLs downward. Final phase-out of leaded fuels in Bulgaria occurred on 1/1/2004, a time frame significantly later than Western Europe, USA, Canada and Australia.

OVERVIEW OF THE ENVIRONMENTAL DATA ASSOCIATED WITH THE KCM SMELTER

The general geographical location of KCM to other communities is shown in the map below:

General Geographical Location of KCM



Source: Wikimapia, 2010

As illustrated by this map, KCM is on a 90 hectare site located between Plovdiv and Assenovgrad. The area around the smelter is one of the most densely populated areas not only in the Plovdiv region but also in the whole country. The villages of Kuklen and Dolni Voden are located within 4 km of KCM. The village of Kuklen is a major focus of potential concern.

The KCM smelter is located in close proximity to several communities in a generally densely populated area. The two closest villages are Kuklen and Dolni Voden.

Environmental Data

Aside from the KCM smelter, there are numerous other relevant sources that can produce significant individual and community level exposures:

- Vehicular emissions
- Indoor sources, particularly cooking and home heating fuels
- Naturally occurring mineralization
- Industrial emissions including public utilities

- Water piping and paint composition at the individual household level
- Solder in cooking pots and cans, cosmetics and medications.

Soil Data

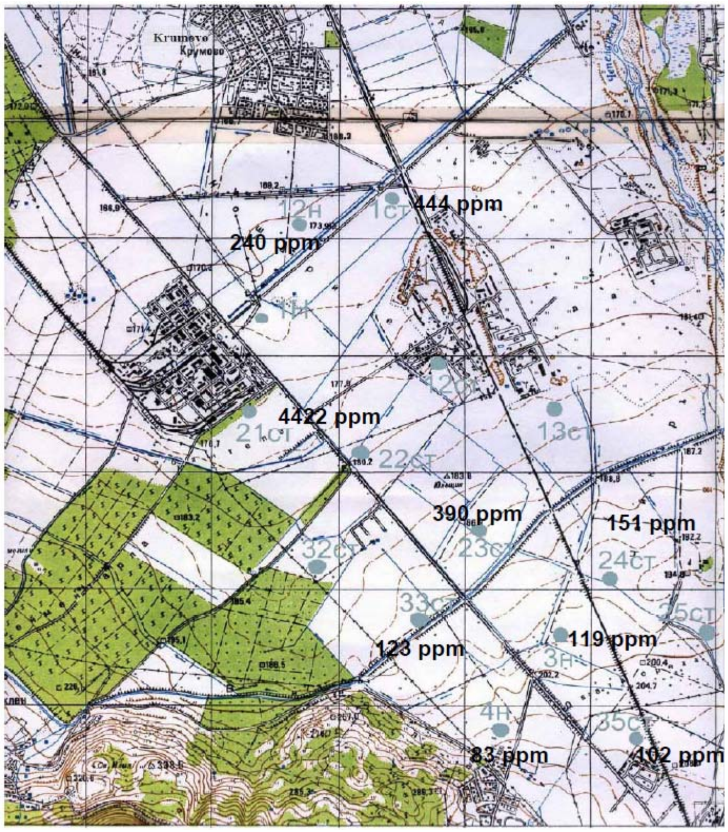
Background soil metals levels at Kuklen, a village 4 km south of the KCM smelter and Boyantsi, a village 14km southeast of Kuklen and considered to be unaffected by potential smelter emissions have previously been evaluated. Kuklen "baseline" (sample taken from 20-40 m depth) concentration was 53 mg/kg for lead. Interestingly the control village of Boyantsi had surficial (0-20 cm) and at depth lead concentrations (20-40 cm) that varied from 225 to 158 mg/kg. Both of these concentrations are significantly greater than Kuklen and other non-industrial areas of Bulgaria. Bulgarian lead background soil concentration averages are 26 mg/kg. The Bulgarian soil screening value for lead is **80 mg/kg, i.e., a level which triggers potential regulatory action.** The Boyantsi site concentrations are significantly greater than 80 mg/kg. The soils of Boyantsi and Kuklen may be naturally more mineralized than those in other parts of Bulgaria.

The KCM smelter is located in a geographical region that has naturally mineralized soils generally greater than other non-industrial areas of Bulgaria. Naturally occurring lead concentrations may be higher than regulatory standards.

KCM activities are a potentially significant contributor to the observed pattern of soil lead concentrations in the geographical area surrounding the smelter. However, the analysis is complex as there are numerous other sources and the KCM source tends to follow a distinct and well documented geographical distribution pattern, i.e., the wind rose pattern, related to meteorological conditions. Meteorologically, the wind blows in a general south-southeast pattern approximately 75% of the year with a northeasterly direction as a secondary pattern. The maximum pollution is detected in the zone bordering the plant within 1000 meters. Within 3000 meters in the relevant wind rose pattern, the lead concentrations falls over 10-fold.

There have been numerous soil surveys for a variety of heavy metals performed by both government and external research groups in the areas near the KCM smelter; in addition, KCM performs its own annual sampling. Area sampling has been reported over an approximately 10 km X 10 km sample frame. The surficial soil sampling is quite consistent with the previously discussed wind rose pattern. The figure shown below presents the most current lead soil sampling data. Soil lead levels rapidly fall to the 100 mg/kg range, a concentration that is within background for mineralized areas.

Lead Soil Sampling Data



Source: Newton Finance Bulgaria AD Report, 2005

The soil lead concentrations rapidly decline and approach background levels as a function of distance from KCM. This is a typical pattern seen in previously studied lead smelters.

Indoor Dust

The overwhelming international experience at mining and smelting sites is that indoor dust levels largely drive the observed pattern of blood levels in young children (ATSDR, 2007). This finding is due to (i) the increased time spent indoors by young children versus adolescents, (ii) the marked hand-to-mouth and crawling behaviors of children under age three (and particularly between ages 18-36 months) and (iii) the increased bioavailability of lead–dust versus soil-lead, *i.e.*, dust is a somewhat more favorable matrix for absorption versus soil. Not surprisingly, blood lead levels tend to peak between ages 18-36 months and then rapidly decline as hand-mouth and crawling behaviors and time spent indoors rapidly declines. Therefore, blood lead sampling targets young children under age 7 and particularly under age 3 for sampling.

Indoor dust is an extremely important exposure pathway, particularly for young children.

The indoor lead dust concentration is likely to be derived from multiple sources, particularly when there is indoor heating and cooking from biomass or solid fuels (wood and/or coal). Numerous published studies demonstrate a strong relationship between interior lead floor dust loading and blood lead level.

There are no indoor dust samples that are available for review in any of the nearby communities. The lack of indoor dust sampling is a potentially significant data gap in the overall set of environmental measurements.

There is a lack of indoor dust sampling for lead in potentially affected communities. This is an important data gap.

Air Data

There is an extensive ambient air monitoring network in the area near the KCM smelter. Summary monitoring data 1995-2005 at three key stations, Assenovgrad, Kuklen and Dolni Voden are shown in the figure below. Assenovgrad, (6 km SE of KCM), measurements reflect a combination of KCM, other industrial enterprises in the immediate area, transport emissions and public utilities. Kuklen (3.5 km SW of KCM) is the closest village downwind from KCM. Dolni Voden station (3.5 km south, south-east of KCM) also reflects KCM emissions. The wind rose from KCM is dominated by: (i) south and southeast (75%) and (ii) northeast directions. The measured levels of soil contamination attributable to KCM are consistent with this wind pattern.

The air pathway is extremely important is likely to be the most important transport route for exposure from KCM to local communities. Therefore, any changes in air lead concentrations will have a significant effect on community exposures.

Map of Key Air Station Locations

Source: Wikimapia, 2010

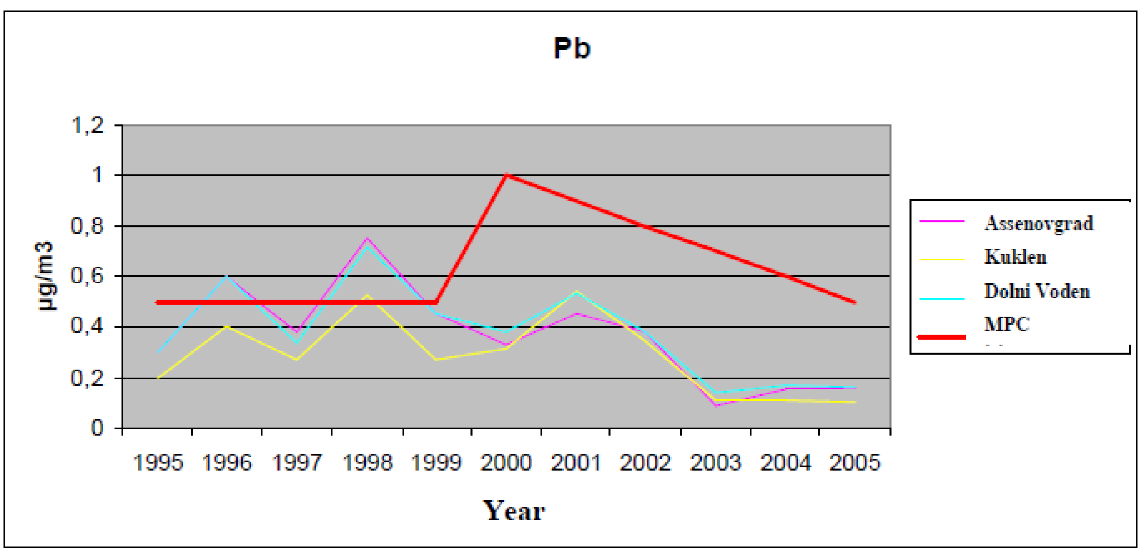
One of the air monitoring stations is located in Kuklen immediately adjacent to a school and medical clinic. The station takes continuous measurements; hence, a very good understanding of the potential KCM lead contribution to Kuklen air can be established. Photos from this air station are shown below.

Air Monitoring Station Kuklen

Kuklen Air Station-Monitoring Equipment

Annual average lead concentrations data from 1995-2005 are shown below for the three major air stations. "MPC" is maximum permissible concentration. The lead concentrations have substantially declined particularly since the 2000/2001 time frame. Significant upgrades (JBIC project) at the KCM facility have undoubtedly been a significant factor in the observed improvement. In addition, leaded fuels were eliminated in Bulgaria as of 01/01/2004.

Average Annual Pb Concentrations for the 1995-2005 Period - Measured at the Stations of Assenovgrad, Kuklen and Dolni Voden



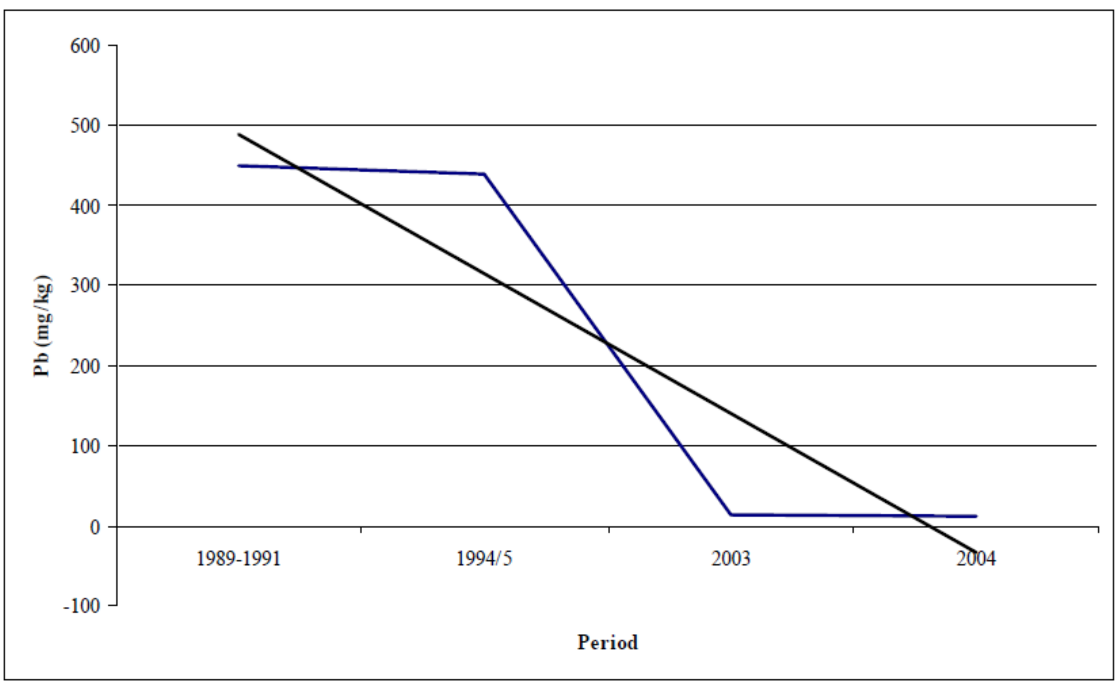
There has been a marked decline in lead air concentrations in local communities downwind from KCM.

Food Data

There has been a significant level of food sampling performed in the general KCM smelter potential area of influence. This sampling has primarily focused on four metals, lead, cadmium, copper and zinc. The uptake of these metals into crops and garden vegetables is highly variable and dependent upon chemical form of the lead in the soil, soil pH, soil organic carbon content, watering practices and type of crop, *e.g.*, root versus fruiting vegetable. Thus, it is extremely difficult to make longitudinal comparisons of food sampling data. Nevertheless, general trends can be observed and have been documented. The measured lead concentration in vegetables from 1989-2004 is shown in the figure below.

Lead concentrations in local vegetables have significantly declined.

Lead Concentration Trend in Vegetation 1989-2004



Source: Newton Finance Bulgaria AD Report, 2005

Summary Environmental Data

Overall, the data indicate that the pattern of exposure is likely to have changed over the 1990 - present time frame. In the earlier years air concentrations were significantly higher and were likely a significant exposure pathway. Similarly, the food pathway was probably more significant prior to 2004 than at the present. Based on extensive experience at other mining and smelting site, the soil pathway, particularly indoor dust, is still likely to be the dominant pathway. Lead is not degraded in the environment; hence, residual lead that is present in the home can be a constant source of exposure.

The role of indoor cooking and heating as a contributor to lead dust levels is unknown but could be significant. Heating sources, particularly coal, can contain significant quantities of lead and can be major contributors to the indoor dust burden. Unfortunately, there are no indoor dust samples from any of the nearby villages.

The Bulgarian environmental soil standard (80 mg/kg) for lead is extremely stringent versus typical European Union (EU) (60-700 mg/kg) and US Environmental Protection Agency (USEPA) values (400 mg/kg) so occasional "exceedances" of outdoor soil lead concentrations are mathematically present, particularly within a few hundred meters of the KCM facility boundary. However, the closest communities would easily meet most EU soil standard values and would be well below US EPA thresholds.

The overall environmental database demonstrates marked improvement over the 1990-2005 time period.

BLOOD LEAD DATA FOR NEARBY COMMUNITIES

Background

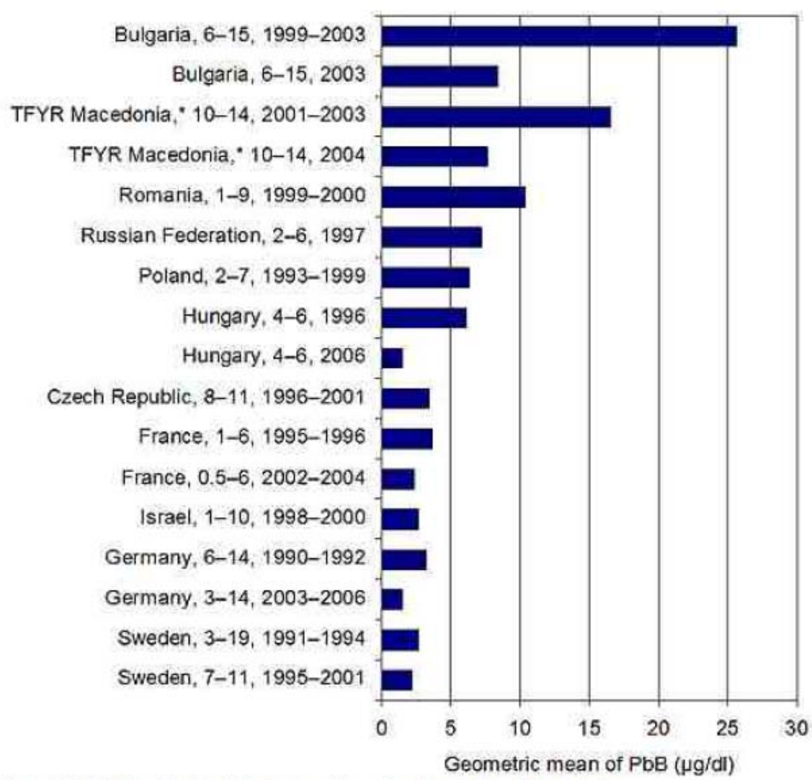
Lead toxicology has been extensively studied and there are thousands of published papers and reports in the scientific literature. Both US and EU environmental health agencies have published extensive literature reviews. The toxicology of lead for young children is different than for adult workers. This non-technical summary is primarily concerned with children in communities near the KCM smelter.

The toxicology of lead is well known.

The current internationally recognized (World Health Organization) BLL target value is 10 µg/dL or 100 µg/L. In the USA, the regulatory standard is complex in that the 10 µg/dl is the BLL target but it is coupled with a population target, *i.e.*, less than 5% of the population should exceed the 10 µg/dL level.

In Bulgaria, the target BLL is 150 µg/L or 15 µg/dL, a level higher than the WHO standard. The Bulgarian standard may reflect a significantly higher underlying "baseline" BLL situation due to higher background levels in the environment, historical industrial contamination or both. Data from the European Environmental Health Information System (ENHIS, 2007) illustrates the situation by comparing Bulgarian BLL data versus other eastern and western European countries. The Bulgarian data are arithmetic means (which tend to be higher than geometric means) and a mixture of industrial and non-industrial studies. Data from communities near KCM may be included in the 1999-2003 dataset.

Blood Lead levels Across the EU



Note. TFYR Macedonia = The former Yugoslav Republic of Macedonia.

Bulgaria 1999–2003: data represent industry

Bulgaria 2003: data represent traffic

The former Yugoslav Republic of Macedonia 2001–2003 and 2004: data represent industry (see Assessment section below, third paragraph)

Data for Bulgaria (2003), the Czech Republic and The former Yugoslav Republic of Macedonia are arithmetic means.

Source: ENHIS,2007

http://enhiscms.rivm.nl/object_document/o4738n27387.html

In the ENHIS figure, the "Bulgarian" data measured BLL in children ages 6-15. It is quietly likely that the critical target group, *i.e.,* children under age 7 years would have had significantly higher geometric mean BLLs than the children ages 6-15. The "true baseline" BLL level for Bulgarian children is unknown or not available; however, it is likely declining but probably still higher than levels seen in Western Europe.

In the mid-1980s, a collaborative study between WHO and the Commission of the European Communities on levels of lead in children's blood found levels of 18.2–18.9 µg/dl in Bulgaria, Hungary and Romania, compared to 11.0 µg/dl in Italy and 7.4 µg/dl in Germany. This difference was still evident in the 1990s, with considerably lower levels in France, Germany, Israel and Sweden than in Hungary, Poland and the Russian Federation.

Background BLLs in Bulgaria are significantly higher than Western Europe

KCM Community BLL Data

There have been a series of community blood lead studies over the 1990-2003 time period. These studies have been conducted by Bulgarian health authorities/ academicians and by independent investigators (Fischer, 2003). These data are summarized below. Detailed age analysis data are not available for any of the published results. The data from the 2003 Fischer paper is described as "This study."

Community Blood Lead Studies

Village/Town	Year	Mean PbB (µg/l) [n]	Range (µg/l)	Author
Kuklen	1990	263 [79]	92 – 520	Zapryanov et al. 1990
Kuklen	1990	272 [179]	253 – 291	Tzonevski et al. 1998
Kuklen	1998	267 [35]	249 – 285	Tzonevski et al. 1998
Assenovgrad	1995	164 [30]	150 – 178	Ecological expertise 1995
Dolni Voden	1995	177 [21]	160 – 184	Ecological expertise 1995
Kuklen	1999/2000	249 [92]	77 – 631	This study
Kuklen / Brestnkik	1999/2000	240 [109]	77 – 631	This study

Source: Fischer, 2003

These data demonstrate a general relationship between BLL and distance from KCM smelter, *i.e.*, Kuklen>Dolni Voden>Assenovgrad. The Fischer *et al.* data for Brestnik is higher than would be expected based on its geographical location, *i.e.*, 6 Km west of KCM smelter. However, the Brestnik data set is extremely small, (n=17; ages 6-10 year) and based on an atypical age distribution. The lack of a change at Kuklen over the 1990-1998 time period is not surprising as the major environmental control modifications occurred after 1999 as part of the large JBIC project which was completed by 2003. Thus, the post-JBIC BLL data sets are the most relevant.

Quantification of the potential KCM contribution to community BLLs can not be accurately made based on the available data. There are numerous methodological issues associated with the historic databases and available published studies.

There is one set of data that has been published in the peer reviewed literature, *i.e.*, Fischer *et al.* (2003). These data are often described by its publication date (2003) however; the sampling was performed in 1999/2000 and does not reflect the significant modifications that occurred as part of the JBIC project. In addition, this paper has numerous methodological problems. The Fischer *et al.* dataset is severely deficient in terms of targeting the most vulnerable age groups, *i.e.* under age three years. No samples were obtained by Fischer for ages less than three. In addition the control group was extremely small (n=18) and taken only from ages 7-9 years.

In 2003, a follow-up study of a subset of Kuklen children who had BLLs greater than 200 µg/L was performed by Bulgarian health authorities. This study is important but it also has significant confounding problems: (i) the resampled children were 3-4 years older so one would expect their BLLs to decline simply as a function of age and changing behavior patterns, (ii) only a subset of children were tested, *i.e.* >200 µg/L and (iii) there were no "new" children under age three tested. These data are shown below.

Concentration intervals of lead in blood	PbB 100-200 µg/l	PbB 201-300 µg/l	PbB 301-400 µg/l	PbB >401 µg/l
Relative share (%) of the investigated group of children from Kuklen in 1999 -2000	6/49 12 %	23/49 46,9 %	16/49 32,6 %	3/49 6,1 %
Relative share (%) of the investigated group of children from Kuklen in 2003	19/51 37,2 %	18/51 35,3 %	9/51 17,6 %	5/51 9,8 %

Source: Phase 2 AMEC Report, 2009

These data demonstrate a marked "left (downward) shift" in BLL distribution. The exception is the BLL>401 µg/L; however, both Kuklen officials and Bulgarian health officials (Prof. Dimitrov-Bulgarian Higher Medical Institute) report that additional investigations demonstrated that the high end children were impacted by contaminated cooking utensil/equipment.

Discussions were held BY NewFields with Kuklen local government officials and there seemed to be minimal interest in a new round of community BLL measurements. There was concern that BLL surveys are invasive and time consuming. There was confidence that things were "improving" and that there was very good ongoing environmental monitoring, particularly for air, soils and food. KCM is very proactive active in the local communities and appears to have a very good reservoir of good will within the communities. Many community residents work at KCM and clearly act as positive ambassadors within the local communities. The economic importance of KCM is obvious to local residents.

- **Despite the obvious lack of local enthusiasm for additional BLL surveys, continuous community-level monitoring is the most efficient and objective method of determining overall community exposures**
- **To some degree, environmental sampling can act as a surrogate for BLL monitoring; however, in order to fulfill this function, the environmental sampling must be comprehensive and cover all relevant pathways and media, e.g., indoor dust.**
- **Appropriate "control communities" must also be monitored if relevant comparisons and detailed analyses are going to be performed.**

The overall trend in BLL demonstrates improvement. There have been both KCM process enhancements and overall secular trends that should be lowering population level geometric BLLs. Without either (i) a newer and more complete set of community BLL or (ii) a full compilation and reanalysis of existing BLLs there will be some level of uncertainty. Fortunately, the environmental monitoring database is quite strong so these data can be used, to some degree, as a surrogate for a more comprehensive BLL database. Finally, based on the environmental and biological sampling, there is minimal concern regarding the other potential metals of concern, *e.g.*, cadmium, zinc, and copper.

- **The community BLL database shows general improvement which is likely to have persisted.**
- **The community environmental database is strong and demonstrates marked improvement; however indoor dust monitoring is not available.**
- **Continued KCM process improvements will enhance the observed downward trend in community BLLs.**
- **Ideally there would be additional community BLL monitoring; however, there seemed to be little local enthusiasm for undertaking this effort.**

- **It is highly unlikely that individual health impacts attributable to lead from KCM will be observed at this time. Even population level clinical health effects would be difficult to objectively document.**
- **Based on the available data, the historic impacts of KCM operations on community BLLs are difficult to fully quantify as (i) there were numerous other confounding sources of lead in the environment, (ii) relevant background levels are not readily available and (iii) historic databases have significant gaps.**
- **Continuous process improvements at KCM will result in improved environmental performance which in turn will have positive impacts on community BLLs.**

PROACTIVE MANAGEMENT

KCM has been active in local communities for a significant period of time. Based on a 2006 report by Prof. Antoaneta Simova, the KCM smelter is perceived by local communities to be closely tied to socio-economics, defined as "community health, income and quality of life." Simova concluded that KCM had "a predominantly positive socio-economic impact" on local communities. The degree of the impact largely depended on the proximity of the KCM to the communities, as well as on the number of community members employed at KCM. In addition, mining/smelting operations tend to have a significant multiplier effect in local communities in terms of supply-chain and service industries (e.g., food service, maintenance, etc.).

The positive role of facility upgrades can not be overstated and local community members view the JBIC investment as a defining moment in KCM operations. According to the Simova report,

"Over the last seven years, the loan has had tremendous impact on the health status of the workers at the KCM. This positive health impact is a critically important parameter in evaluating the overall results from the loan, since it carries over positive spill-over effect on all other parameters – income, quality of life, psychosocial health, social awareness, etc. For some of them, it is even a prerequisite - one cannot earn income if one is sick; one cannot fully enjoy life if one is sick; one cannot contribute to one's community if one is sick or dead."

Thus, continuous process improvement is inextricably tied to objective environmental performance and perceived worker and community satisfaction. Stakeholder engagement is critical but it must also be tied to objective and verifiable improvements that can be seen and experienced by local communities. Hence, the proposed EBRD loan is an essential activity in order for KCM to actively and positively engage local communities.

- **A key component in KCM stakeholder engagement is the demonstration of continuous process improvements that in turn produces economic viability, enhanced environmental performance and improved worker/community health outcomes.**
- **The EBRD loan is an essential component of future KCM community and stakeholder engagement.**

While the current KCM stakeholder engagement process is active and transparent, there are a number of enhancements and improvements that could be readily tied to the proposed EBRD loan:

- Sampling can be rapidly and inexpensively expanded by the use of multi-metal XRF analyzer. The existing laboratory sampling programme could be used to confirm the results of XRF sampling by split sample analysis of 5-10% of samples.
- The current zone-based sampling should be expanded to cover a 360 degree pattern around the smelter. Based on enhanced sample sizes, standard concentration isopleths should be calculated and mapped.
- The soil sampling programme should be expanded and include some indoor dust sampling at key communities; if high levels of indoor lead are documented then limited isotopic analysis could be considered in order to accurately establish source attribution.
- Crop and garden sampling should continue.
- Awareness of indoor air exposures, particularly from the use of coal as a home heating fuel, should be emphasized.
- BLL data in non-exposed workers who reside in key communities should be analyzed for trends. This would be an indirect surrogate for community BLL trend monitoring.
- The historic unpublished Bulgarian Higher Medical Institute BLL database should be collected, reviewed and summarized. These data are worth publishing in an academic journal and will establish the true trends across the KCM proximate communities.
- The pros and cons of a new comprehensive community BLL survey should be discussed with the current key community stakeholders and the relevant Bulgarian health and academic authorities. NewFields does recognize that, at

present, community stakeholders have limited enthusiasm for this effort. Nevertheless, NewFields believes that objective BLL is the best direct method of establishing community exposure levels.

- NewFields applauds the excellent stakeholder engagement effort of KCM and urges continued support for this programme.

- Continued investment in process improvements will enhance environmental performance which in term will lower the KCM contribution to local blood lead levels.

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