GIEC
Georgia Industry Environmental Coalition

February 12, 1999

Mr. Tim Cash, Program Manager
Hazardous Sites Response Program
Georgia Department of Natural Resources
Environmental Protection Division
205 Butler Street, SE; Suite 1462
Atlanta, Georgia 30334

Dear Mr. Cash:

The Georgia Industry Environmental Coalition (GIEC) has reviewed the Georgia Environmental Protection Division's (EPD's) December 17, 1998, response to comments on the proposed Lead Rule amendments to the Rules for Hazardous Site Response (Rules).

Certain features of the December 17th draft Rules amendments represent a definite improvement over the way the current Rules deal with lead. In particular, the proposed Lead Rule raises the notification concentration for lead from a bright-line concentration of 300 mg/kg to 400 mg/kg and allows the use of the blood-lead models to compute site-specific soil ingestion Risk Reduction Standards (RRSs). EPD's letter of December 17th asks GIEC to comment on whether EPD should go forward with the proposed Lead Rule. Given the diverse interests represented by GIEC, it has been very difficult for the group to come to consensus on EPD's December 17th proposal. On balance, however, given the overall improvements afforded by the proposed Lead Rule, GIEC believes EPD should move forward with proposing this Lead Rule to the Board.

As we have stated on previous occasions, we believe this rule-making presents an opportunity to revise the RRSs for lead in groundwater, and we are disappointed that EPD declined this opportunity. While we support EPD in going forward with the soil Lead Rule, we propose that EPD and GIEC initiate dialogue on the issue of ground-water lead standards as soon as the soil Lead Rule is finalized.

GIEC remains committed to working with EPD following this rule-making on the issue of lead in groundwater. We are hopeful that through those efforts we can arrive at RRSs for lead in groundwater that are amply protective, represent sound science and are cost effective.

GIEC also viewed this rule-making as an opportunity to develop a rule that (1) establishes reasonable Type 1 and Type 3 standards; (2) recognizes the fact that the lead models establish average, not bright-line, concentrations; and (3) permits the use of site-specific, ground-water numbers in calculating Type 2 and Type 4 soil leaching standards for lead. As you know, we have previously provided considerable, well-researched comments on these issues, as well as other issues, on the soil Lead Rule. We have included as an attachment a summary of our comments following the sequence of your December 17th letter.

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GIEC appreciates the opportunity to work with you and your staff on these issues. We believe that the technical forums afforded us provided a framework for working together on these issues and would serve well for future discussions. We look forward to continuing those efforts in the future.

Sincerely,

Eduardo Granados
HSRA Workgroup Chairman

James R. Baker
Chairman

Cc: J. Kaduck, D. Word, H. Reheis
GIEC General Membership

ATTACHMENT

This attachment represents GIEC's feedback to a set of responses made by EPD in a December 17, 1998, document addressed to GIEC. To fully understand the context of this feedback, the reader should be familiar with at least two documents (EPD letter of December 17, 1998 and GIEC letter of September 18, 1998), which can be obtained by contacting the GIEC office @ 770-421-3520.

Baseline Blood-lead Level Correction and Clarification

Computing the 1.38 µg/dl geometric mean proposed by EPD entails making the assumption that all non-detectable values in the baseline data set are equal to one-half the detection limit. While this "one-half assumption" may be suitable for normally distributed data with a "true zero" minimum, GIEC believes it is not a suitable approach for a log-normal data set, such as the NHANES data. As the NHANES data shows, the minimum blood-lead value must be greater than true zero because lead is naturally ubiquitous in the environment and will, therefore, be present in all blood at some non-zero level.

We believe a more accurate approach is to derive the geometric mean from the line of best fit for the log-normal distribution of the detectable data. This line-of-best-fit approach yields a geometric mean of 1.36 and a geometric standard deviation (GSD) of 2.04 with the only assumption being that the non-detectable values follow the same log normal distribution as do the detectable values. The attached probability distribution plot (Figure 1) graphically demonstrates the problem with the one-half-detection-limit assumption for blood-lead values.

For the foregoing sound scientific reasons, GIEC believes a better approach is to use a geometric mean of 1.36 µg/dl with a GSD of 2.04.

IEUBK and GALM Yield Mean Exposure Concentrations, Not Maximum Concentrations

It is a scientific fact that the lead concentration terms (whether used as inputs or computed as outputs) for proper scientific application of the child and adult blood-lead models are average concentrations over the exposure area and exposure duration. Conversely, lead-model concentration terms are definitely not maximum (bright-line, single-point) concentrations as EPD has chosen to assume in the proposed Lead Rule draft.

EPD's December 17 response seems to acknowledge agreement with this scientific fact but still goes on to justify the EPD-proposed application of the lead-model concentration terms on the basis that to do otherwise "...would be inconsistent with how clean-up levels for other regulated substances are used under the existing Rules."

By way of further comment to EPD, GIEC points out that the way the existing HSRA Rules use the Risk Assessment Guidance Superfund (RAGS) concentration term is inconsistent with the scientific basis for the RAGS equations and inconsistent with U.S. EPA's RAGS supplemental guidance (EPA, 1992) for calculation of the RAGS concentration term.

U.S. EPA's guidance for computing the RAGS concentration term is clear: the exposure concentration term in the RAGS equations (the same equations used in HSRA) is the arithmetic mean of the exposure-area (EA) concentration over the exposure duration. The RAGS exposure concentration term is not intended to be a bright-line, single-point clean-up concentration as EPD has incorrectly assumed in the existing Rules.

GIEC recommends that EPD modify the proposed HSRA application of the IEUBK and GALM models to properly reflect the fact that the lead concentration term in the models is the arithmetic average and not a bright-line, single-point clean-up concentration. In its public comments of September 18, 1998, GIEC suggested EPD consider a mean-to-maximum multiplier of 3.0 for application of model results but EPD has not responded to that previous suggestion. Another way to deal with the average concentration term is to allow use of exposure-area composite soil samples to determine compliance with Risk Reduction Standards (RRSs). This composite sample approach is detailed in U.S. EPA's Technical Guidance for Soil Screening Levels (EPA, 1997).

Water Ingestion Concentration Term in Lead Models

The lead concentration for the water ingestion term used in the IEUBK model and the GALM should be the average concentration of lead in the water ingested by individuals occupying the subject site. The most appropriate way to determine this concentration is to test the tap water at the site; or if there is no water supply available on site, to test the most-likely source, or sources, of potable water. This may or may not entail an on-site, ground-water source, depending on site-specific conditions. EPD has, however, proposed to require that the concentration of lead in groundwater at the site be assumed as the drinking water ingestion concentration term in the models. EPD may be assuming that such an implicit "all groundwater is drinking water" assumption will always be conservative and, therefore, highly protective. However, EPD's assumption ignores the fact that lead concentrations in tap water may commonly exceed the concentration of lead in site groundwater because lead in tap water is primarily related to lead in pipes, plumbing and fixtures rather than lead in the raw water source. EPD should revise the December 17 proposal to reflect that the water concentration term used in the models when calculating a soil ingestion limit must be the concentration of lead in the water ingested at the site, which may or may not be the site groundwater, depending upon site-specific water supply conditions.

It is important that EPD implement a scientifically sound Lead Rule now and look forward, in the near future, when the HSRA Rules for other substances can be properly revised consistent with sound, scientific principles.

Site-specific, Ground-water Criteria Needed

GIEC acknowledges EPD's interest in narrowing the scope of the Lead Rule to deal only with lead issues. At the same time, we believe the Lead Rule should provide the sound scientific means to derive site-specific, risk-based standards for both soil **and** groundwater reflecting the realistic potential for site-specific exposure. Because risk-based, soil clean-up levels for the leaching-to-groundwater scenario are directly linked to the site-specific, ground-water criteria, the Lead Rule should also accommodate use of the lead models or other appropriate scientific means to derive realistic Type 2 and Type 4 site-specific, ground-water RRSs. (See next comment for further detail.)

RRSs For Lead In Groundwater

In EPD's December 17 response, it states "To reiterate, in the interest of moving forward on this proposed rule, we have chosen to limit the scope of the rule to establishing clean-up standards for lead in soil under Types 2 and 4." EPD goes on to state that "...Concentrations for lead in groundwater can already be derived from Table 1 of Appendix III of the Rules...", which are the HSRA Type 1 and Type 3 RRSs taken from drinking water maximum contaminant levels (MCLs) and U.S. EPA (drinking water) Health Advisories.

EPD further states that "...Using the IEUBK or GALM to establish ground-water concentrations would be inconsistent with how we have established Table 1 values of other substances...". EPD has apparently misunderstood GIEC's previous comments on this issue. GIEC does not recommend any change to the Table 1 value of 15 µg/l but rather recommends that the HSRA Rules allow site-specific application of the lead models to compute both soil and ground-water site-specific (Type 2 and Type 4) RRSs. To not allow such site-specific Type 2 and Type 4 flexibility for lead would actually be inconsistent with the way other substances are dealt with in the current HSRA Rules. For example, the Table 1, Appendix III (Type 1 and Type 3 RRSs) value for PCE is the MCL of 5 µg/l; but by using EPD's default exposure assumptions, the Type 2 (site-specific, residential) ground-water value is 14 µg/l and the Type 4 (site-specific, non-residential) value is 40 µg/l. And if the respondent can justify a less-stringent, site-specific exposure scenario, the Type 2 and Type 4 RRSs for PCE can be even higher. For EPD to specify all groundwater at a fixed upper limit of 15 µg/l for lead is unreasonable and unnecessary. GIEC reiterates its request that the Lead Rule provide the necessary flexibility to use the lead models for Type 2 and Type 4 ground-water and soil RRSs.

Additionally, the effect of EPD choosing not to address lead in groundwater in the Lead Rule is to force Type 2 and Type 4 "site-specific" ground-water RRSs to the existing Type 1 and Type 3 RRSs of 15 µg/l. This will also directly impact Type 2 and Type 4 soil concentrations for lead because the Type 2 and Type 4 leaching-to-groundwater soil concentrations would be predicated on a 15 µg/l ground-water value, irrespective of the Type 2 or Type 4 site-specific, exposure scenario.

Point of Exposure Considerations

GIEC acknowledges EPD's interest in limiting the scope of the Lead Rule to lead issues at this time. Once the Lead Rule is adopted, we respectfully request that the Director promptly convene and consult with the Hazardous Waste Trust Fund Advisory Committee and other stakeholders regarding these point-of-exposure issues and other warranted revisions to the Rules.

Baseline Blood-lead Levels Already Reflect Ambient Soil and Drinking Water Concentrations

EPD may have misunderstood GIEC's earlier comment. While it is true that we do not have actual ambient soil and drinking water concentrations for the State of Georgia (or the NHANES Southern Region), we do know that the ambient concentrations are greater than zero. As for soil, the natural ambient mean for the NHANES Southern Region is 13 mg/kg based upon the USGS study of metals in undisturbed natural soils. Because the baseline blood-lead data are for the Southern Region, we should, therefore, adjust the model-computed adult lead in soil values by 13 mg/kg across the board to at least reduce the magnitude of "double counting" the baseline. This adjustment is not a change to the adult lead model; it is simply a recognition of the scientific basis for the model. If this ambient soil adjustment is not made, we know that all GALM-computed results for soil will be at least 13 mg/kg too low. For these sound, scientific reasons, GIEC reiterates its request that a default 13 mg/kg adjustment for the Southern Region ambient soil concentration be included in the GALM.

Soil Ingestion and Lead Absorption Terms Must Be Average Values

We trust EPD will move promptly to revise the Rules should the lead model assumptions or defaults become outdated.

Types 1 and 3 RRSs Need to be Revised Also

EPD states that "...Using the IEUBK to establish Type 1 soil concentrations would be inconsistent with how we have established Type 1 soil concentrations for other Table 2 substances which represent background." By way of further comment, GIEC points to the existing Rules that define Type 1 standards as follows: "...Type 1 standards provide for regulated substance concentrations that pose no significant risk on the basis of standardized exposure assumptions and defined risk levels for residential properties." The 75 mg/kg Table 2 value for Type 1 lead in soil is, by EPD's description, a background-based number and is not, therefore, established "...on the basis of standardized exposure assumptions and defined risk levels for residential properties." By choosing to keep the Type 1 lead standard in soil at a background value of 75 mg/kg, EPD has set the Type 1 soil value at a concentration that is too low for the stated purpose of Type 1 standards. A more reasonable, and yet highly conservative, Type 1 standard for lead in soil would be a bright-line concentration of 266 mg/kg, which is the average soil concentration term computed from the IEUBK model with 15 µg/l in all water ingested. By using this average IEUBK concentration term as a bright-line value, a generic Type 1 residential RRS of 266 mg/kg is still highly protective and more consistent with the Rules' definition of a Type 1 risk-based standard than is the background-based, existing Type 1 standard of 75 mg/kg.

Reasonably assuming a mean-to-maximum multiplier of 3.0 for lead distributions at a site, a bright-line maximum of 266 mg/kg is equivalent to a mean soil concentration of 89 mg/kg, which is 4.5 times more stringent than U.S. EPA's yard-wide average concentration of 400 mg/kg for protection of children in a full-time residential scenario.

In a similar manner, the 400 mg/kg Type 3 RRS that EPD has proposed is not consistent with the Rules' definition of a Type 3 standard as follows: "...Type 3 standards provide for regulated substance concentrations that pose no significant risk on the basis of standardized exposure assumptions and defined risk levels for the non-residential use scenario." To the contrary, EPD's proposed 400 mg/kg as a bright-line, single-point maximum for Type 3 soil is the IEUBK-derived U.S. EPA average (yard-wide) soil concentration for children in the full-time residential scenario. A more reasonable, and still highly protective, Type 3 RRS for soil would be 940 mg/kg as a bright-line, clean-up concentration. This is the average concentration computed using the GALM with 15 µg/l lead in all water ingested. Reasonably assuming a mean-to-maximum multiplier of 3.0 for lead distributions, a bright-line concentration of 940 mg/kg is equivalent to an average soil concentration of 313 mg/kg, which is still less than U.S. EPA's yard-wide average of 400 mg/kg for protection of children in a full-time residential scenario. So even if children were present full time on a Type 3 non-residential site, a bright-line RRS of 940 mg/kg would still provide ample protection.

For sound, scientific reasons, GIEC reiterates its recommendation that the Type 1 and Type 3 soil RRSs be revised to 266 mg/kg and 940 mg/kg, respectively.

EPD Versus EPA Lead Clean-up Standards

The proposed U.S. EPA Toxic Substance Control Act (TSCA) lead-in-soil standards are intended for protection of children in full-time residential settings across the nation. The "temporary control measures" that EPD cites as a premise for the TSCA standards has to do with the potential use of barriers and access controls to limit exposure and is not at all related to U.S. EPA's selection of the 400 mg/kg "level of concern" or the 2000 mg/kg "hazardous standard". The 2000 mg/kg removal level is based upon a cost-benefit analysis but the 400 mg/kg yard-wide -average concentration is strictly a risk-based (IEUBK) level above which residents would be informed of the potential risks. Reasonably assuming a mean-to-maximum multiplier of 3.0 for lead distributions, the U.S. EPA yard-wide-average concentration of 400 mg/kg is equivalent to a bright-line value of 1200 mg/kg. On this basis, the proposed Type 3 bright-line, <u>non-</u>residential value of 400 mg/kg is 3 times more stringent than the U.S. EPA <u>residential</u> value. Similarly, the EPD Type 1 residential bright-line of 75 mg/kg is 16 times more stringent than the U.S. EPA residential value. As for RCRA and CERCLA risk-based threshold levels, U.S. EPA's soil screening level for residential soils (with children present) is an average exposure-area concentration of 400 mg/kg. Therefore, in comparison to CERCLA and RCRA standards, EPD's Type 1 residential bright-line clean-up standard of 75 mg/kg is 16 times more stringent than U.S. EPA's <u>average</u> residential screening level of 400 mg/kg.

Type 4 Non-residential Sites and Children

As a point of clarification, GIEC's prior comments pertained only to non-residential Type 4 properties where children may be periodically present as visitors. GIEC is not suggesting use of the GALM at residential properties. GIEC's point is that the proposed draft Lead Rule would limit the use of the GALM to only those Type 4 non-residential sites "...where it can be determined that children are not and will not be present, ...". A literal reading of the word "present" would mean that only the IEUBK child model would be applicable to Type 4 non-residential sites where a child may be a visitor to the Type 4 property at any time. More appropriately, we believe the Lead Rule should allow use of both the IEUBK and GALM for Type 4 non-residential properties so that the limiting, site-specific exposure scenario (e.g., visiting child or occupational adult) can be identified. To essentially ban children from Type 4 non-residential properties as the proposed Lead Rule seems to imply would be an unnecessary limitation that would further deter the rehabilitation of contaminated property for non-residential commercial uses.

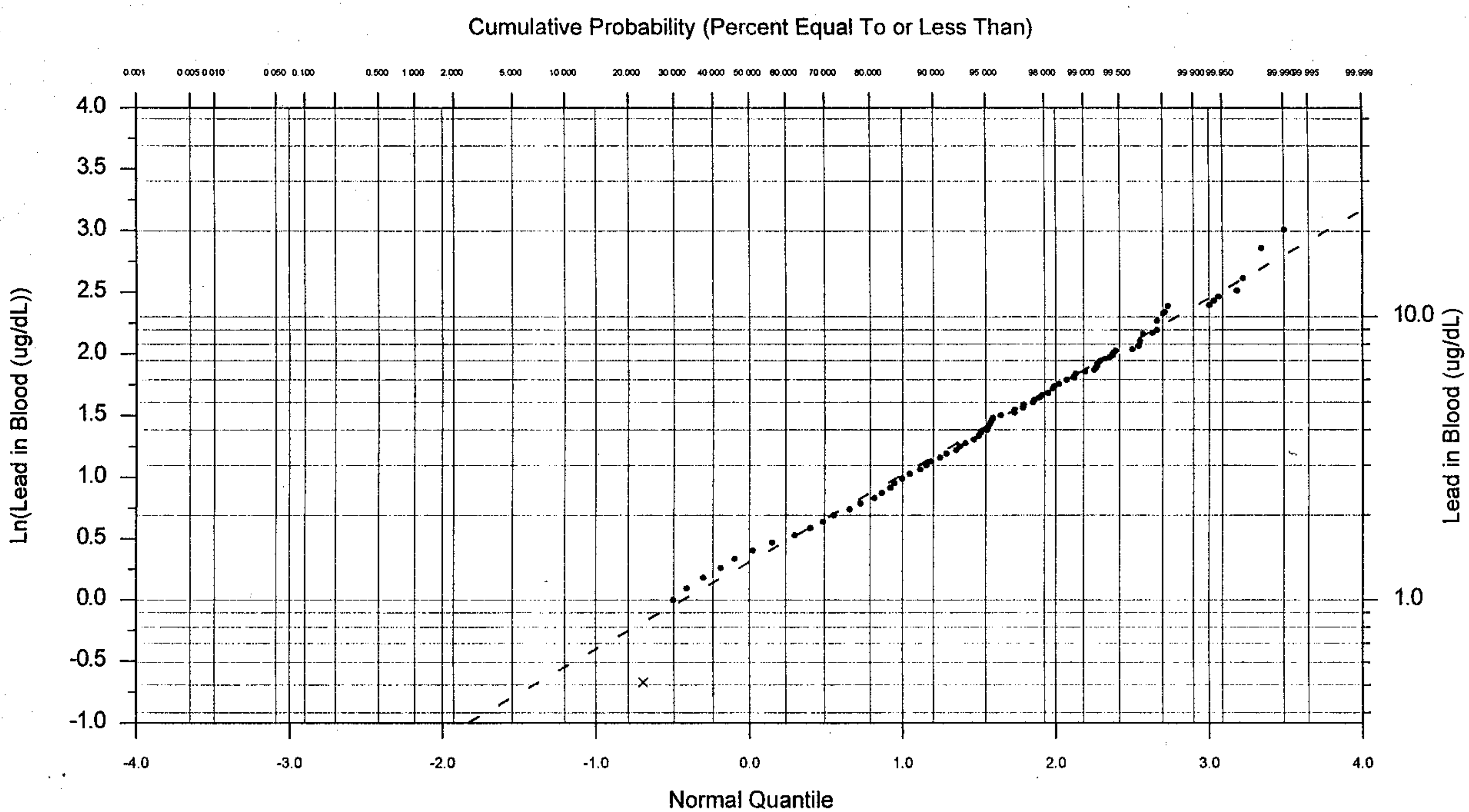
GIEC recommends that the Type 4 lead criteria be revised to allow joint use of the IEUBK and GALM models to appropriately determine the site-specific limiting use and exposure scenario for both adults and visiting children. Further, we would like some indication from EPD about the suitability of U.S. EPA's "child occupied" definition as a reasonable way to determine when the GALM is, or is not, appropriate for Type 4 non-residential properties.

"General Considerations"

GIEC acknowledges EPD's desire to narrow the scope of the proposed Lead Rule to only address lead-related issues. In any event, we would still like to better understand EPD's interests regarding the prior proposed language.

Type 4 Soil "Zone of Ingestion"

EPD's response is helpful. We now understand that the "zone of ingestion" for applicable Type 4 soil ingestion criteria is a site-specific determination and may be less than two feet with adequate justification.



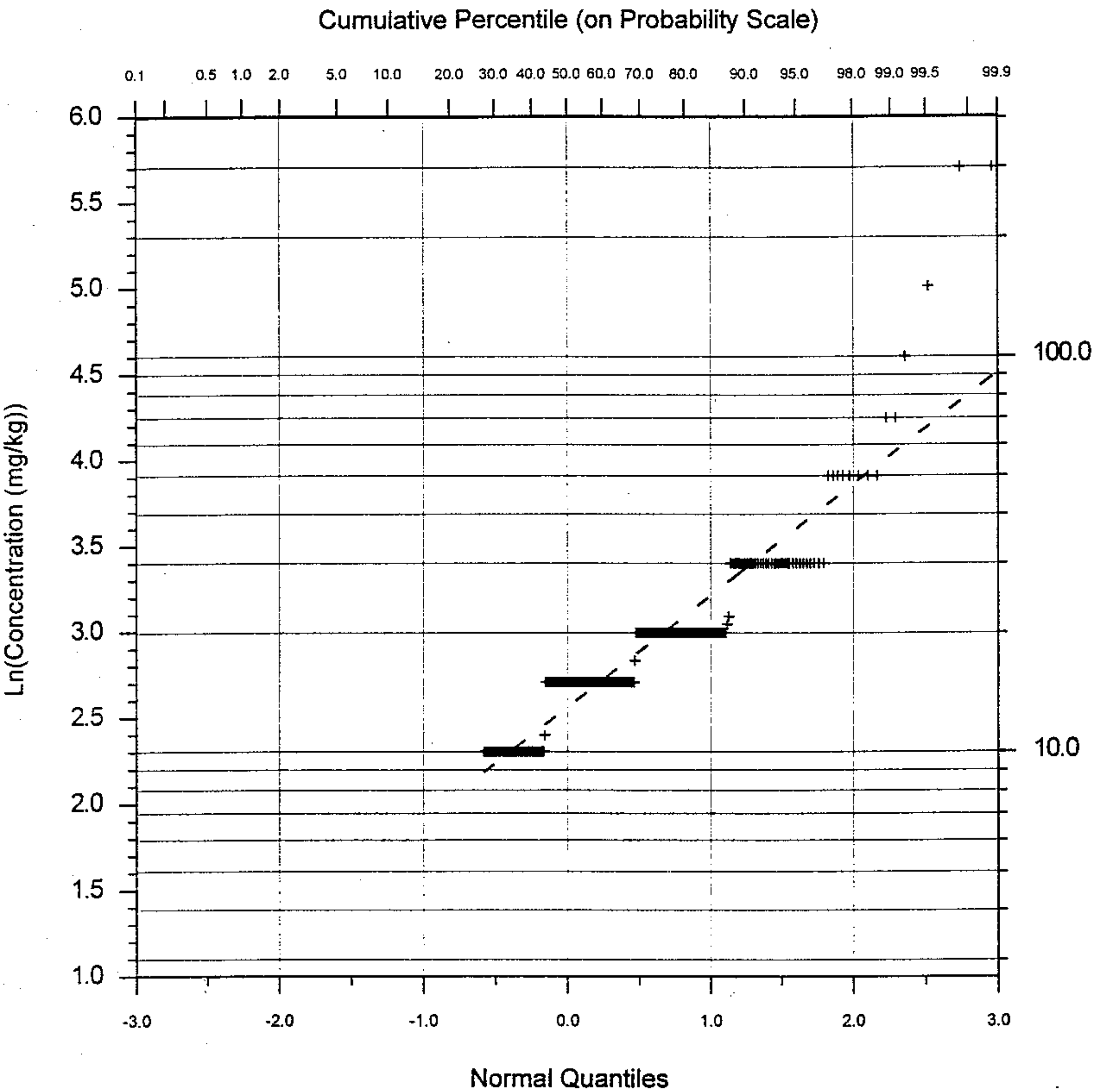
– – – Line-of-Best-Fit ($R^2 = 0.994$) for NHANES-weighted detectable data; Assume the ND values follow the distribution of population. Ln-data pass Filliben Normality Test.

Geometric Mean: $e^{0.314}$ (1.36 ug/dL)

Geometric Standard Deviation: $e^{0.714}$ 2.04

× Illustrates out-of-line plotting position for ND values if assumed equal to one-half the detection limit; this is not, therefore the most appropriate assumption for these data.

Figure 1. Probability Distribution of NHANES-Weighted Lead Concentration in Blood
Women Ages 16 - 49
Southern US
NHANES III - Phase 2



The Ln(data) passed the Studentized Range Test.
The regression of the detected-only data shows the median of 2.562 and the standard deviation of 0.650 for the Ln(data).

Data Source: Chemical Analysis of Soil and Other Surficial Materials of the Conterminous United States By J. G. Boerngen and H. T. Shacklette, USGS Open-File Report 81-197, 1981

NOTE: 111 samples under detection limit (10) not plotted.
Total 400 sample measurements.

Figure 2. Probability Plot of Lead Concentration
Natural Soils, Southern US