Dear Colleague

This is the read_me file for the ORPEX exercise and materials. Please read this thoroughly as it should hopefully answer most questions and avoid difficulties.

The ORPEX materials are intended to simulate situations involving mobile measurements using gamma ray spectrometry such that users may get a taste of what is involved, obtain practice with data types typical for such measurements and hopefully get an introduction to the methods involved. More advanced users should find the materials interesting. The materials are not intended for users hoping to test new analysis methods, advanced analysis routines and so on.

The exercise is divided into three ”Trips”, 1,2 and 3.

Trip 1 is a short tour on a straight road along which have been placed two easily found and identified sources. The purpose of this trip is to check that everything is working, that users can work with the data and to familiarise oneself with how the next two trips will proceed. This trip will be distributed before the others and is not a trip for which results should be reported. The route is only about 10 minutes long.

Trip 2 is a longer more complex tour through a mostly built up area. A number of less easily located and harder to locate/identify sources have been placed along this route to represent orphan sources or maliciously placed sources or whatever. The goal is to locate as many sources as possible and attempt to identify them such that a foot team can follow up later (not represented in this exercise).

Trip 3 is approximately the same route as that of Trip 2 (a little shorter) except all orphan sources have been removed. An incident has occurred resulting in possible contamination of the area – the mobile team has been asked to identify areas of maximum fallout and determine a general picture of the deposition pattern.

The materials provided are designed so that users have a number of options and the most flexibility possible in analysing the data.

The primary data type is the ”playback file”. This is a file that is openable in the custom playback software and is typical of the types of software provided by most manufacturers. More information and instructions can be found in the subsequent section.

For each trip, all the individual spectra have been provided in 4 common formats and named according to their unique identifiers. Please do not mix up the spectra for Trip 2 and Trip 3 as they have the same number/names. This is so users can, if desired, open and analyse the individual spectra in the gamma analysis software they normally use.

For each trip a video file is provided. This is a screen capture of the entire trip as seen on the playback software screen. This is for users who may for some reason not want to install the playback software. With this option of course, interaction is limited to the

controls provided in whatever video software is being used and is obviously less than is available in the playback software.

For each trip a Google Earth file is included. This represents each trip as a series of waypoints in typical Google Earth fashion and lets users ”see” where they were at any point of a trip. Hovering the mouse over any individual waypoint provides some information as to the measurement for that point (see later section). The waypoint numbers correspond to the unique spectrum identifiers.

For each trip a spreadsheet is provided. This consists of all the measurements for each trip. The first column provides the unique identifier, the second and third are latitude and longitude and the rest of the columns contain channel data for each individual spectrum. This file lets users manipulate the data such as they want to, sum spectra, subtract spectra, correct for background etc etc.

A full list of technical considerations are provided in the section entitled ”**ORPEX TECHNICAL DETAILS”.** The information in that section should provide answers to many of the most typical questions. **Users are encouraged to read that section carefully.**

ORPEX TECHNICAL DETAILS

The ORPEX materials are intended to simulate the basics of vehicular gamma ray spectrometry. Given the difficulty in simulating all aspects of the environments in which such measurements are made, assumptions have been made of necessity and limitations are described in the following text.

1. The time “lag” in real vehicular spectrometry has not been included for practicality. What appears on the screen represents the radiation environment the vehicle is passing through at that moment. Please ignore the effect of variable speed of the vehicle (except for Point 6 below).

2. For Trip 2 and Trip 3 there are some seconds of data missing. These are between 15285 and 15293. It is possible to notice a shift in background/signal between these points. This is of no consequence to the exercise and should be just ignored.

3. Please ignore all date stamps on exercise materials such as spectra etc. There are no decay or other aspects that require corrections for time. The date a spectrum was accrued has no bearing whatsoever on the exercise.

4. Please assume that the live time is, for all spectra, 1 s. Live time should have no role to play in the provision of results of the type towards which ORPEX is oriented.

5. Stripping factors, attempts at efficiency calibrations etc etc. will not work with this material (99% certain of that).

6. The sources featured in the exercise materials are those that may be found in medical, industrial and other applications or special nuclear materials. Please do not assume that because your country does not utilize these isotopes that they will not be present in the exercise. Please note that isotopes with super short half lives (minutes or less) are of course not included.

7. For spectra that are provided – please ignore any energy information contained in file types that typically contain such information (such as .cnf spectra). A point source spectrum has been provided. This should be used to conduct an energy/shape calibration. The source contains ^{134}Cs and ^{60}Co.

8. Please remember that mobile spectra are typically accrued over periods of seconds and over 256 channels and therefore may seem slightly different than lab based spectra.

9. Please remember that the vehicle may be stopped at traffic lights or at any other point during the trips. And that data is being accrued even while stopped.

10. Please assume that what is on-screen in Google Earth is exactly the situation as the measurement was being made ie. if a car is present on screen, then it was present when the measurement was made.

11. Please remember that sources may be collimated to “shine” in certain directions or that sources may be shielded.

12. The sources have not been simulated such that activity determinations may be made. Please do not report activity. Air kerma rate or similar data may of course be used to locate sources but should not be employed in attempts to calculate activity.

13. Please remember that individual spectra may be summed to get a better picture, or subtracted or be subjected to any other operation the participant sees fit. One can for example accumulate 20 or 30 spectra, take an average, use that as a background and subtract it from any other spectrum.

14. The individual spectra formats being provided are Ortecs .chn, Canberras .cnf, IAEA .spe and channel_tab text files. Due to extraneous information in the .cnf format, the spectra collections are a large download. It is suggested that .chn

represents a more manageable download if you prefer. The chn files are openable in Genie (at least later versions of it).

15. Spectra are also being provided in spreadsheet format (tab separated csv) to make mathematical operations easier. As some versions of Excel (up to 2007 ?) do not handle 257 columns, the spreadsheet from OpenOffice may be used (http://download.openoffice.org/other.html#tested-full) or any later version of Excel may be used. In this spreadsheet, the unique spectrum identifier is being provided, latitude and longitude coordinates and the contents of each channel, 1 row per spectrum.

16. If participants choose to not use the software being provided to look at the data, a playback of the "screen" for each trip is being provided in a standard video format. This should be openable in most video players. Participants are encouraged to ensure that their own video player has all necessary codecs or whatever installed.

17. Please not that in the video recording of the playback alarms have been left at an arbitrary default value.

18. In relation to Google Earth, information has been included in the KML files themselves. This can be seen by hovering the mouse pointer in Google Earth over the points.

n = 497 - Google Earth Identifier
ID = 1097 - The Unique Spectrum Identifier
GPSLat = 63.403851 - GPS Latitude WGS-1984
GPSLong = 13.019443 - GPS longitude WGS-1984
LiveTime = 0.891 - the live time for the spectrum in seconds
BTC = 72115.60045 - raw cps in the total spectrum
BK = 2747.47475 - raw cps in the K-40 "window"
BU = 30.30303 - raw cps in the uranium "window"
BTh = 29.1807 - raw cps in the thorium "window"
BCs = 4083.05275 - raw cps in the Cs-137 "window"
PTC = 72115.60045 - processed
PK = 5793.0757
PU = 17.76013
PTh = 15.99356
PCs = 39196.19127
Kerma = 3.07135 - measure of the total kerma rate
KermaAnt = 2.75103 - measure of the kerma rate due to anthropogenic sources
KermaNat = 0.41656 - measure of the kerma rate due to natural sources
Spectrum = 989 0 0 0 0 0 0 3 54 174 3493 3338 4000 2532 2189 2539 2601 2880 2029 2033 2079 1790 1429 1725 1766 1710 1672 1575 1462 1430 1175 982 1145 1150 973 796 739 734 642 623 588 524 542 528 503 522 503 480 462 444 433 432 407 429 415 406 411 350 425 363 430 422 462 425 428 443 482 496 461 502 514 549 603 612 635 660 737 812 837 841 791 765 794 699 677 701 607 552 617 762 971 1482 2252 2862 3086 2912 2145 1364 768 391 263 286 500 882 1523 1981 2259 2148 1636 1126 655 296 141 64 55 11 18 20 23 14 12 5 3 3 1 1 3 0 1 3 1 3 6 0 2 2 5 2 2 0 1 1 1 1 1 0 1 2 0 1 1 1 1 1 1 1 1 0 0 1 1 0 0 2 2 2 2 1 1 0 1 3 3 3 2 3 1 0 1 0 2 0 0 0 0 1 1 1 0 1 0 0 0 1 1 1 1

0 2 2 1 0 0 2 2 0 0 4 1 2 1 3 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 66 - actual spectrum data.

The kerma rates should not be viewed as absolute values but rather as mathematical representations of the relative contributions of anthropogenic and natural sources to the overall kerma measurement. This data can be used to observe trends in kerma rates from point to point etc.

REPORTING

1. There is no need to report for Trip 1.

2. For Trip 2 -- the unique spectrum number nearest to where the source is presumed to be, the GPS coordinates read from Google Earth and the possible identity of the source.

3. For Trip 3 – the easiest way to report is to take a screen shot (shift + Print Screen) of the area over which the participant thinks contamination is present and draw in the areas where contamination is assumed present. Alternatively a picture may be printed on hardcopy and the areas drawn in by hand. This can then be scanned or whatever and returned to me. The goal for Trip 3 is to highlight where the contamination is and where it is highest, where it is medium and where it is low.