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NAS PENSACOLA
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DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
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5090/13
Code 1851
16 June 1998

CERTIFIED MAIL-RETURN RECEIPT REQUESTED

Mr. John Mitchell
Florida Department of Environmental Protection
MS 4535
2600 Blair Stone Road
Tallahassee, FL 37399-2400

Subj: USE OF FRACTION INGESTED/FRACTION CONTACTED TERM IN RISK ASSESSMENTS AT NAS PENSACOLA

In response to your email dated May 6, 1998, the Navy is submitting the enclosed memorandum detailing the use of fraction ingested/fraction contacted (FI/FC) in its risk assessments. The Navy disagrees with the State's opinion that a default value of 1 should be applied.

As is stated in the memorandum, FI/FC was used and calculated in accordance with RAGS Part A. The FI/FC term that was applied was doubled to account for any uncertainty of soil impact. Using a default value of 1 would suggest that the entire site is contaminated at the maximum detected concentration which is not indicated by the empirical data collected and is not in accordance with RAGS or USEPA recommendations. The end result would be an overestimate of risk that would eventually lead to excessive remedial action volumes and costs. The Navy believes that the fractions applied are protective of future residential users at Florida's acceptable risk goal of 1E-6. Unless Florida can provide reference to a statute or rule that specifically prohibits use of FI/FC, the Navy will not revise the risk estimates.

Sincerely,

William J. Hill

WILLIAM J. HILL
Environmental Engineer
Installation Restoration I Branch

Encl:
Memorandum dated 16 June 1998

Copy to: (w/encl)
NAS PENSACOLA (Ron Joyner)
U.S. EPA (Gena Townsend)
EnSafe, Memphis (Allision D. Harris)

MEMORANDUM
16 **JUNE1998**
The **Use** of Fraction Ingested/Fraction Contacted Term in the NAS Pensacola **Risk** Assessments

In certain situations, the **risk** assessments for **NAS** Pensacola, Site 38 and Operable Unit 2 employed fraction ingested/fraction contacted (FI/FC) terms in the equations used to calculate chronic daily intake (CDI). RAGS Section 6.4.1 discusses the concept of contact rate or factor, which "...reflects the amount of contaminated medium contacted per unit time or event." (USEPA, 1989). Ted Simon, USEPA Region 4, originally suggested using FI/FC for federal facilities, and his suggestion is in accordance with **RAGS** Volume I Human Health Evaluation Manual (part A) p.6-39, which states, "a term can be used to account for the fraction of soil or dust contacted that is presumed to be contaminated (FI)." (USEPA, 1989). **This** memorandum discusses the methods and rationale used for determining FI/FC and its appropriate use. Furthermore, this memo provides justification for the use of FI/FC and how, when used appropriately, it provides a conservative estimate of CDI.

The **risk** assessment for Site 25, located in Operable Unit 2, is used **as an** example of when and how FI/FC was used. Initially, FI/FC was considered when the 95% UCL calculated for any given surface soil COPC exceeded its maximum detected concentration. This was considered the first sign that a "hot spot" may exist. RAGS requires that when the 95% UCL exceeds the maximum detected concentration the maximum concentration is preferred for use **as** the Exposure Point Concentration (EPC) (USEPA, 1998; USEPA, 1995). Aroclor-1260 surface soil data for Site 25 produced a 95% UCL that exceeded its maximum detected concentration. Upon closer evaluation it was apparent that the maximum reported concentration did not adequately represent the distribution of Aroclor-1260 in the surface soil of the site **as a** whole or that of a reasonable exposure unit area (one-half acre was assumed to be a reasonable exposure unit area). This was especially true since the next highest reported concentration of Aroclor-1260 in surface soil was more than an order of magnitude lower than the maximum concentration. Generally it is unreasonable to assume that a potential receptor would be chronically exposed to an isolated "hot spot" area of maximum concentration. The second step for deciding if FIEC was appropriate was to determine if the "hot spot" could be adequately defined. The "hot spot" area for Aroclor-1260 was bounded either by nondetect samples, samples with much lower concentrations, or buildings. **As** a result, FIEC was considered to be appropriate for use in calculating soil pathway CDI for Aroclor-1260.

The next step was to determine an appropriate value for the FI/FC term. This was accomplished by comparing the area of impacted soil to a reasonable exposure unit area (assumed to be one-half acre). **A** one-half acre exposure unit area is comparable to a typical residential lot. Since future use of the site is unknown, exposure to the soil conditions at the site was assumed to be random within the one-half acre exposure unit area. For example, if only half the exposure unit area is contaminated, an FI/FC term of 0.5 would be used. As a conservative measure, a distinction was made between the area of maximum impact and the area of impacted soil. The Remedial Investigation Report map of Site 25 was used to estimate the areal extent of Aroclor-1260 surface soil impacts. For Aroclor 1260 the area of maximum concentration encompasses approximately 700 square feet which is 0.03 of the one-half acre exposure area. In contrast, the area of Aroclor-1260 soil impacts encompasses **an** area of approximately 5,300 square feet which

is 0.2 of the one-half acre exposure area. The FI/FC term used to calculate Aroclor-1260 CDI was set equal to 0.4 (twice the estimated proportion) to account for any uncertainty in the areal extent of Aroclor-1260 soil impacts. As a result, use of the FI/FC term in conjunction with the maximum detected concentration has the effect of expanding the area of maximum Aroclor 1260 soil concentration from 700 square feet to approximately 8,700 square feet (approximately four tenths of the square footage of one-half acre). This results in a conservative yet reasonable approximation of CDI for Aroclor-1260 under unknown future land use scenarios.

Tables 1 and 2 compare the FI/FC method used in the OU 2 and Site 38 risk assessments with another "hot spot" method sanctioned in RAGS. Section 6.5.3 explains that for sites with uneven contamination or "hot spots" it is reasonable to use activity patterns to estimate soil exposure concentrations. RAGS goes on to suggest that averaging data over the area the size of a one-eighth acre residential backyard may be appropriate for evaluating residential soil pathways. The area of Aroclor 1260 soil impacts encompasses 5,300 square feet (which is approximately one-eighth of an acre) and has an average concentration of 6.9 mg/kg. As shown on Tables 1 and 2 the CDIs calculated using the maximum concentration in conjunction with an FI/FC term of 0.4 yields a higher estimate of CDI than does the mean concentration of Aroclor 1260 in the worst-case one-eighth acre area.

In conclusion, the FI/FC methods used for the OU 2 and Site 38 risk assessments provide a conservative yet reasonable estimate of CDI for COPCs that are unevenly distributed across a site. Additionally, use of FI/FC in the risk assessments serves to focus attention on area of the site that may need to be addressed in the Feasibility Study and were developed in accordance with RAGS.

References:

USEPA, 1989, United States Environmental Protection Agency, *Risk Assessment Guidance for Superfund Volume I, Human Health Evaluation Manual (Part A)*, EPA/540/1-89/002, December 1989.

USEPA, 1995, Supplemental Guidance to RAGS Bulletins, USEPA, Region IV, November 1995.