

**New York State Department of Environmental Conservation
Division of Environmental Remediation, Room 260B**

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MEMORANDUM

To: Bureau Directors, Section Chiefs, Regional Spill Engineers and Regional Hazardous Waste Remediation Engineers
From: Michael J. O'Toole, Jr., Director, Division of Environmental Remediation
Subject: **Determination of Soil Cleanup Levels**
Date: *signed 12/20/00*

Since the Division of Hazardous Waste Remediation and Spills Management were combined, efforts have been underway to consolidate similar activities. One such effort is the determination of soil cleanup. Existing documents included TAGM 4046: Determination of Soil Cleanup Objectives and Levels; and STARS Memo #1: Petroleum Contaminated Soil Guidance Policy. TAGM 4046 was designed as guidance for the determination of cleanup levels at Inactive Hazardous Waste Sites. STARS #1 was designed to determine when petroleum contaminated soil can be released from regulation but has been used to determine soil cleanup levels. While a direct comparison of the guidance values not possible for the contaminants included in both documents, (one uses total concentration while the other is leachate based), the values are not the same. This has lead to much confusion as well as some criticism of not being consistent across the program.

As part of the requirements of the efforts to reform the superfund, standards that apply to all cleanups for a variety of different property uses will probably have to be developed. However, that effort will not be completed for some period of time. Until that effort is completed, TAGM 4046 is to be used for the determination of soil cleanup levels at all sites that are under this Divisions' purview. Minor technical corrections are currently being made to TAGM 4046 to address changes in groundwater standards, update partitioning coefficients and to further explain the process used when contamination exists in close proximity to the groundwater. These minor changes will also include adding the contaminants to the TAGM 4046 tables that are included in STARS #1 but not currently included in TAGM 4046. Attached is a table of soil cleanup objectives for those contaminants which can be used until the technical revisions are completed. (*Editor's note: the original table listing soil cleanup objectives for those contaminants has been superseded by two new tables that list soil cleanup objectives for contaminants found in [gasoline](#) and [fuel oil](#) contaminated soil and incorporate the eight contaminants not currently included in TAGM 4046*).

It is recognized that petroleum spill sites do not go through the same process as inactive hazardous waste sites. This directive does not change the STARS #1 process or the process of determining the

appropriate remedy at a petroleum spill site. The intent is only to substitute the soil cleanup objectives contained in TAGM 4046 for the numerical values in the tables in STARS #1. In general, the soil cleanup objectives for individual contaminants should be used. The maximum values listed in TAGM 4046 may be used when many specific contaminants from one class of contaminant (e.g., semi-volatiles) are present with no single contaminant predominating. The maximum values are not to be used if the individual values are exceeded. The primary objective is to achieve those values. However, if it is infeasible to achieve the objectives, further evaluation is conducted to determine if a less conservative value may be used for the specific spill site. The values in Table 1 and Table 2 of STARS #1 will continue to be used for its stated purpose: “To provide direction on the handling, disposal and/or reuse of nonhazardous petroleum contaminated soils.”

This directive is effective immediately. If there are any questions relative to the use of TAGM 4046 soil cleanup objectives for petroleum sites, please contact Jim Harrington at (518) 457-0337 (518) 402-9758.

cc:

Attachments: [Recommended Soil Cleanup Objectives for Gasoline Contaminated Soils](#)
[Recommended Soil Cleanup Objectives for Fuel Oil Contaminated Soils](#)

**Recommended Soil Cleanup Objectives for
Gasoline Contaminated Soils**

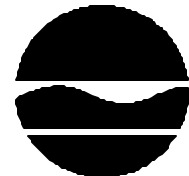
Contaminant	CAS Registry Number	Partition coefficient Koc	Recommended EPA Method	Groundwater Standards/ Criteria C _w ug/l or ppb	Allowable Soil Concentration Cs ¹ (ppm)	Soil Cleanup objectives to Protect GW Quality (ppm)*	USEPA Health Based (HEAST)		Detection Limit Solid (ppb)	Rec.soil Cleanup Objective (ppm)
							Carcinogens (ppm)	Systemic Toxicants (ppm)		
Benzene	71-43-2	83	8021/8260	0.7	0.0006	0.06	24	N/A	2	0.06 or MDL
Ethylbenzene	100-41-4	1,100	8021/8260	5	0.055	5.5	N/A	8,000	2	5.5
Toluene	108-88-3	300	8021/8260	5	0.015	1.5	N/A	20,000	2	1.5
Mixed Xylenes	N/A	240	8021/8260	5	0.012	1.2	N/A	200,000	2	1.2
Isopropylbenzene	98-82-8	454	8021/8260	5	0.023	2.3	N/A	3,100	1	2.3
n-Propylbenzene	103-65-1	741	8021/8260	5	0.037	3.7	N/A	N/A	1	3.7
p-Isopropyltoluene	99-87-6	2,114	8021/8260	5	0.11	11.0	N/A	N/A	1	10.0*
1,2,4 - Trimethylbenzene	95-63-6	2,590	8021/8260	5	0.13	13.0	N/A	N/A	1	10.0*
1,3,5 - Trimethylbenzene	108-67-8	661	8021/8260	5	0.033	3.3	N/A	N/A	1	3.3
n-Butyl-Benzene	104-51-8	2,455	8021/8260	5	0.12	12.0	N/A	N/A	1	10.0*
sec-Butyl-Benzene	135-98-8	2,200	8021/8260	5	0.11	11.0	N/A	N/A	1	10.0*
Tert-Butyl-Benzene	98-06-6	2,200	8021/8260	5	0.11	11.0	N/A	N/A	1	10.0*
Naphthalene	91-20-3	1,300	8021/8260	10	0.13	13.0	N/A	300	1	13.0
Methyl-Tert-Butyl-Ether (MTBE)**	1634-04-4	12	8021/8260**	10	0.0012	0.12	N/A	N/A	1	0.12
N/A - Not applicable MDL - Method Detection Limit 1 - Allowable concentration with no Dilution Attenuation Factor - see TAGM 4046	<p>*As per TAGM 4046 individual and the sum of VOCs not listed (Tentatively Identified Compounds(TICs)) ≤ 10 ppm</p> <p>** Methyl t-butyl ether (MTBE) is not a target compound of Methods 8021 and 8260, but MTBE may be determined using these methods with appropriate quality assurance and quality control measures.</p> <p>Note: Soil cleanup objectives are developed for soil organic content (f) of 1 %, and should be adjusted for the actual soil organic content if it is known.</p>									

**Recommended Soil Cleanup Objectives for
Fuel Oil Contaminated Soil**

Contaminant	CAS Registry Number	Partition coefficient Koc	Recommended EPA Method	Groundwater Standards/ Criteria Cw ug/l or ppb.	Allowable Soil Concentration Cs ¹ (ppm)	Soil Cleanup objectives to Protect GW Quality (ppm)	USEPA Health Based (HEAST) (ppm)		Detection Limit Solid (ppb)	Rec.soil Cleanup Objective (ppm)
							Carcinogens	Systemic Toxicants		
Benzene	71-43-2	83	8021/8260	0.7	0.0006	0.06	24	N/A	2	0.06 or MDL
Ethylbenzene	100-41-4	1,100	8021/8260	5	0.055	5.5	N/A	8,000	2	5.5
Toluene	108-88-3	300	8021/8260	5	0.015	1.5	N/A	20,000	2	1.5
Mixed Xylenes	N/A	240	8021/8260	5	0.012	1.2	N/A	200,000	2	1.2
Isopropylbenzene	98-82-8	454	8021/8260	5	0.023	2.3	N/A	3,100	1	2.3
n-Propylbenzene	103-65-1	741	8021/8260	5	0.037	3.7	N/A	N/A	1	3.7
p-Isopropyltoluene	99-87-6	2,114	8021/8260	5	0.11	11.0	N/A	N/A	1	10.0*
1,2,4 - Trimethylbenzene	95-63-6	2,590	8021/8260	5	0.13	13.0	N/A	N/A	1	10.0*
1,3,5 - Trimethylbenzene	108-67-8	661	8021/8260	5	0.033	3.3	N/A	N/A	1	3.3
n-Butyl-Benzene	104-51-8	2,455	8021/8260	5	0.12	12.0	N/A	N/A	1	10.0*
sec-Butyl-Benzene	135-98-8	2,200	8021/8260	5	0.11	11.0	N/A	N/A	1	10.0*
Tert-Butyl-Benzene	98-06-6	2,200	8021/8260	5	0.11	11.0	N/A	N/A	1	10.0*
Naphthalene	91-20-3	1,300	8021/8260/8270	10	0.13	13.0	N/A	300	1(330)	13.0
Anthracene	120-12-7	14,000	8270	50	7.00	700.0	N/A	20,000	330	50.0**
Acenaphthene	83-32-9	4,600	8270	20	0.92	92.0	N/A	5,000	330	50.0**
Acenaphthylene	208-96-8	2,056	8270	50	1.03	103.0	N/A	N/A	330	50.0**
Benzo(a)anthracene	56-55-3	1,380,000	8270	0.002	0.028	2.8	0.224	N/A	330	0.224 or MDL
Benzo(b)fluoranthene	205-99-2	550,000	8270	0.002	0.011	1.1	0.220	N/A	330	0.220 or MDL
Benzo(k)fluoranthene	207-8-9	550,000	8270	0.002	0.011	1.1	0.220	N/A	330	0.220 or MDL
Benzo(g,h,i)perylene	191-24-2	1,600,000	8270	5	80.00	8,000.0	N/A	N/A	330	50.0**
Benzo(a)pyrene	50-32-8	5,500,000	8270	0.002	0.11	11.0	0.061	N/A	330	0.061 or MDL
Chrysene	218-01-9	200,000	8270	0.002	0.004	0.40	N/A	N/A	330	0.4
Dibenzo(a,h)anthracene	53-70-3	3,300,000	8270	50	1,650.00	165,000.0	0.0143	N/A	330	0.0143 or MDL
Fluoranthene	206-44-0	38,000	8270	50	19.00	1,900.0	N/A	3,000	330	50.0**
Fluorene	86-73-7	7,300	8270	50	3.65	365.0	N/A	3,000	330	50.0**
Indeno(1,2,3-cd)pyrene	193-39-5	1,600,000	8270	0.002	0.032	3.2	N/A	N/A	330	3.2
Phenanthrene	85-01-5	4,365	8270	50	2.18	218.0	N/A	N/A	330	50.0**
Pyrene	129-00-0	13,295	8270	50	6.65	665.0	N/A	2,000	330	50.0**
N/A- Not Applicable	*As per TAGM 4046 individual and the sum of VOCs not listed (Tentatively Identified Compounds(TICs))≤ 10 ppm									
MDL - Method Detection Limit	**As per TAGM 4046 individual non-carcinogenic semivolatiles ≤ 50 ppm and total semivolatiles not listed (Tentatively Identified Compounds(TICs))≤ 500ppm									
1 - Allowable concentration with no Dilution Attenuation Factor - see TAGM 4046	Note: Soil cleanup objectives are developed for soil organic carbon content (f) of 1%, and should be adjusted for the actual soil organic carbon if it is known.									

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Erin M. Crotty
Commissioner

MEMORANDUM

To: Bureau Directors, Section Chiefs, Regional Spill Engineers, Regional Hazardous Waste Remediation Engineers
From: Michael J. O'Toole, Jr, Director, Division of Environmental Remediation
Subject: Response to Comments Relative to 12/20/00 Soil Cleanup Consolidation Memo
Date: *signed April 10, 2001*

Provided below are responses to the questions that have been raised as a result of the December 20, 2000 memo which directed the use of the soil cleanup objectives in TAGM 4046 to determine the appropriate soil cleanup level at petroleum spill sites. Comments have been generally grouped by category to show the spectrum of opinions and to minimize duplicative responses. There will be outreach to affected parties but the specifics have not yet been finalized. If there are any questions, please call Jim Harrington or Frank Peduto.

Site Investigation and Cleanups

- 1. Comment:** There will likely be cases where petroleum contaminated soil will exceed 4046 [soil cleanup objectives] for individual SVOCs, but would be below the STARS TCLP values. Could this soil be excavated, tested for STARS TCLP parameters and simply spread on the ground at the spill site?

Response: Common to both STARS and TAGM are the health based criteria (aka, direct contact numbers). As a result, the likelihood of exceeding TAGM and passing STARS is very small. Even if the soil passed the TCLP criteria it more than likely would fail the health based values. However, if you can demonstrate protection of groundwater (by using TCLP) **and** the total contaminant concentration levels are below the direct contact numbers, the soil could be placed back in the excavation or spread on the site.

Excavation of contaminated soils should continue to be removed to the extent practical, thereby supporting our goal of pre-release where feasible. Excavated soils will continue to be regulated by STARS. In cases where remediation of in-situ soils is necessary, our goal will be to ensure protection of public health and the environment through the application of TAGM 4046.

Example: If a site passes the TAGM criteria, they would receive a “no further action” letter. There may be cases where the site exceeds TAGM for one or more compounds but a TCLP test confirms no leaching to groundwater and the total contaminant concentration is below the direct contact number. If additional cleanup is not feasible or impractical, and all other site issues are satisfied, this site could also receive a “no further action letter.”

2. **Comment**: How rigid are the TAGM cleanup criteria? Does any exceedance automatically require investigation or remediation?

Response: The soil cleanup objectives in TAGM 4046 should be treated in the same manner as the guidance values in STARS. They are directly applicable to determining how far a cleanup has to extend when a decision has been made that remediation is needed. They can be used to determine when investigation and/or remediation is appropriate but are not absolute and judgement has to be exercised. For example, one minor exceedance in a number of samples would not seem to be a justification for more sampling or remediation.

3. **Comment**: If the excavation sample results meet the TAGM 4046 levels, but still exceed STARS, should we require groundwater sampling?

Response: The lack of residual soil contamination is not necessarily a good indicator of groundwater contamination and achieving acceptable soil cleanup is not the only consideration for installing groundwater wells. Professional judgement should be used to determine if groundwater monitoring should be required. Knowledge of the spill history and site specific conditions (i.e., proximity to drinking water wells, depth to groundwater, soil types, and stratigraphy, etc.) should be considered when determining if groundwater sampling is appropriate.

4. **Comment**: Is Spills to use the entire TAGM 4046 list or to continue to limit the investigation to the STARS #1 list?

Response: Spills personnel should not include all of the other TAGM 4046 contaminants in their investigations unless there is reason to believe these contaminants are present. Separate tables have been put together which resemble Tables 1 and 2 in STARS #1.

5. **Comment**: When does someone utilize soil cleanup objectives of 500 ppm for semi-volatile organic and 10 ppm for volatile organic compounds?

Response: In general, the soil cleanup objectives for individual contaminants listed in the tables should be used. However, TAGM 4046 does contain maximum contaminant values for classes of contaminants. These may be used when many contaminants from one class of contaminant are not listed in the tables (such as tentatively identified compounds (TICs)) and are present with no single contaminant predominating. This has been the approach used by the hazardous waste program.

An example of the application of the maximum contaminant values would be where a spill involved a weathered fuel. The soil samples were analyzed by EPA 8270 + 20 TICs and all of the individual compounds were below their recommended cleanup objective, but there is residual contamination. The 20 TICs may be evaluated and compared to the maximum contaminant value for that particular class of contaminant.

6. **Comment:** TAGM 4046 has maximum values of 500 ppm for semi-volatile organic compounds and 10 ppm for volatile organic compounds. Does this limit total petroleum hydrocarbons (TPH) to a max of 510 ppm?

Response: While TPH may be used to provide operational control during a cleanup, it is not recognized (in either STARS or TAGM) as being useful in determining whether acceptable cleanup levels have been achieved. As indicated above, the cleanup levels for the listed contaminants should be achieved and the total concentration values should be used for the unlisted contaminants. Recommended laboratory testing methods have been added to the tables.

7. **Comment:** The table attached to the December 20, 2000 memo which provided soil cleanup objectives for the STARS compounds not listed in TAGM contains several VOCs with recommended cleanup objectives > 10 ppm (i.e., sec-butylbenzene = 25 ppm). TAGM 4046 states that the total VOCs must be ≤ 10 ppm. How can the individual cleanup objective be greater than the total?

Response: The recommended soil cleanup objectives for the VOCs where the calculated value exceeds 10 ppm have been revised and will default to 10 ppm.

Determining Cleanup Objectives Protective of Groundwater

8. **Comment:** There is a concern over the protectiveness of the TAGM levels when contaminated soil is close (within 3-5 feet) to groundwater. Should the TAGM numbers [soil cleanup objective] be divided by 100? Is a groundwater investigation automatically required?

Response: The soil cleanup objective should not be divided by 100 to address this concern. When soil is close to groundwater, a dilution attenuation factor of 40 may be used. This means to multiply the calculated value for protection of groundwater [allowable soil concentration] by 40. In the alternative, the Technology Section may be contacted for assistance. This factor does not apply to the levels for total volatiles, semi-volatiles, etc., or where the direct contact values drive the soil cleanup objective (e.g., benzo(a)pyrene). Language indicating this has been drafted for the TAGM revision that is underway. If soil contamination exceeds the groundwater protection numbers (either in TAGM or STARS), an evaluation of groundwater is necessary. Judgement has to be exercised relative to the amount of investigation necessary. For example, in coarse soils, installation of a well is always appropriate. However, if soils are

very tight and excavation has progressed to the point where the contamination has been removed, a well may not be necessary. It should be pointed out the Technical Guidance Manual requires wells be installed in most cases.

9. **Comment:** STARS allows for the use of the TCLP Extraction Guidance Values (Groundwater Standards) which are compared to concentration of an analyte detected in a liquid TCLP extraction obtained from a soil sample. TAGM 4046 requires direct analysis of soils for total analyte concentration. I think this should be directly stated when notifying parties who will be affected by the change in use of documents used to determine soil cleanup objectives.

Response: We agree that the need to analyze for total contamination should be clearly conveyed to the affected parties. The outreach will include such a statement. However, it is also the responsibility of the project managers to reinforce this information when communicating with the affected parties. The December 20, 2000 memo directs use of TAGM which only uses direct analysis.

However, as stated earlier, if a responsible party wishes to use TCLP (compared to groundwater standards) to demonstrate protection of groundwater, and the total analysis indicates that there is not a direct contact threat, use of TCLP (in conjunction with total concentration) is acceptable.

10. **Comment:** There is a concern that the Tables in TAGM 4046 are based on 1% organic carbon and many soils have levels significantly below 1%. The soil organic carbon content used as a default in Guidelines for Petroleum Spill Site Inactivation exposure assessment tables is 0.5%

Response: TAGM 4046 allows for, but does not require, determination of the site specific organic carbon content of soil. If soil samples are collected to determine organic content, the project manager should ensure that the samples are representative of the soils which contain the contamination, but should be taken from an area outside the contamination. The project manager should use professional judgement and consider site specific information such as date of the spill and the presence of groundwater contamination prior to establishing a soil cleanup level based upon the partitioning model.

Management of Soils

11. **Comment:** Should the TAGM be used for in-situ bio-treatment?

Response: Yes, the TAGM should be the goal. However, in many cases, the levels in the TAGM will not be able to be achieved by in-situ bio-treatment or other types of in-situ treatment. The same process used today should be used to determine when the system can be shut down.

12. **Comment:** This memo does not specifically distinguish between in-situ and ex-situ petroleum contaminated soil.

Response: As originally developed, STARS #1 shall be used for excavated petroleum contaminated soil. TAGM 4046 shall be used for in-situ petroleum contaminated soil.

13. **Comment:** After soil removal, if the post excavation samples pass TAGM 4046 but fail STARS #1, does DER support “no further action?” If so, why isn’t the same standard applied to the soil that has been excavated?

Response: DER would support “no further action” at sites where TAGM 4046 levels were achieved. Excavated material that is below TAGM but above STARS may still be regulated as solid waste.

14. **Comment:** Will TAGM 4046 be used in its entirety to make determinations of in-situ soil remedial goals and whether STARS will be used to determine if ex-situ soils may be reused or must be disposed?

Response: Yes. Material being sent off-site (“ex-situ”) which would be below TAGM and above STARS #1 could still legally be considered a solid waste. Soils which contain contaminants at or below STARS #1 levels would be an unregulated material and could be sent off-site.

Contaminant Tables

15. **Comment:** A table should be developed that breaks down the compounds the same way as STARS #1 listing the compounds in separate tables for gasoline and fuel oil contaminated soils.

Response: These tables will be provided and attached.

Site closure

16. **Comment:** Should sites that meet TAGM but not STARS be inactivated or closed? How do we track sites that meet TAGM and are closed but have soil removed which exceeds STARS?

If a site is closed, meeting TAGM, but we believe if the soil is excavated it may need further treatment per STARS, do we need to modify our closure letter? For instance, should we include a paragraph that states something like “though the site satisfies TAGM and is considered closed: if future activities will result in the excavation of soil, the soil may need further testing and/or Remediation?” If that is the case, do we need to track the site or put a deed restriction on the property?

Response: At this time, sites that are remediated to TAGM may be closed with no deed restrictions. The closure letter should indicate that material that is subsequently removed from the site which exceeds STARS could still legally be considered solid waste. Additional sampling and/or remediation may be necessary at that time.

NOTE: Phil Lodico and Dale Desnoyers are currently developing a standardized closure letter. In the interim, you should adjust your current letter to reflect the above.

Soil with low levels of contamination exists throughout the state and is routinely moved from one place to another. Data from soil recyclers in New York City indicates that this unregulated material frequently have levels exceeding STARS. For this reason, we do not see a need to track the sites.

TAGM 4046 relationship to Guidelines for Petroleum Site Inactivation

17. **Comment:** Three compounds (pyrene, anthracene, and benzo (g,h,i) perylene) in the Guidelines for Petroleum Spill Site Inactivation range from a factor of 2 to 9 times below the TAGM. What levels should be used? 1,2 Dibromomethane is included in the Guidelines for Petroleum Spill Site Inactivation memo. Will it be included in TAGM 4046 or Spills #1?

Response: The levels in TAGM 4046 should be used. The tables in the Petroleum Spill Inactivation Guidance and their application are under review. The exposure numbers in the Inactivation Guidance cannot be compared to the TAGM numbers. The compound 1,2 dibromomethane is not an analyte in the methods normally used at petroleum sites (8020 and 8021). It is infrequently encountered at petroleum or hazardous waste sites. For these reasons, it will not be included in the tables.

18. **Comment:** Can the Guidelines for Petroleum Spill Site Inactivation still be used to inactivate a site? Can consideration to exposure assessments discussed in the “Interim Cleanup Guidance” still be used? It is often not practical to consider pre-release conditions or even TAGM for some spills?

Response: While the fate of the Petroleum Spill Inactivation Guidance is under review, the first three steps (Characterization, Source Removal and Remediation) should still be followed. With respect to the exposure values, see the above response.

Transition

19. **Comment:** How do you handle a site where sampling occurred or a work plan was approved under the STARS approach prior to consolidation?

Response: If soils were analyzed by both TCLP and total contaminant levels (e.g., EPA methods 8020, 8021 and 8270), the responsible party could request to apply the soil cleanup objectives in TAGM 4046. However, if the work plan was approved and the investigation only included TCLP analysis, then the cleanup will have to comply with the STARS approach (e.g., TCLP extraction guidance value), unless the responsible party is willing to collect additional soil samples and analyze them for total contaminant concentrations. One problem with using TCLP only is in regard to the semi-volatiles which could pass the TCLP extraction, but there would be no data to indicate if the contaminants were present at levels higher than the direct contact values.

- 20. Comment:** Is a generic announcement going out to all of the contractors? When and how will the regulated community (including contractors & consultants) be informed of these changes as they apply to petroleum contaminated sites?

Response: Yes. One is being developed. However, other than the changes regarding site closure and the extent of remediation, we don't envision significant changes to the manner in which Spills investigates and remediates their sites.

- 21. Comment:** It is our position that STARS was not intended for in-situ soil evaluation (i.e., was it being misused)? This is a weakening of cleanup standards. How was this done without going to public notice?

Response: STARS was intended to "provide direction on the handling, disposal and/or reuse of non-hazardous petroleum soils (Paragraph 2, page 1). The applicability section indicates that STARS may be "applied to both excavated and non-excavated soils" (Paragraph 4, page 1). Section 7 (page 25) indicates that "additional guidance will be developed to establish procedures for evaluating the potential impacts of non-excavated (in-situ) contaminated soils." Based on the above, STARS was being properly used for in-situ soil until additional guidance was developed. This additional guidance is to use TAGM 4046 soil cleanup objectives as directed by the Division Director in the December 20, 2000 memo. Both TAGM and STARS have been through the public review phase and there is no need to do it again now. However, the TAGM will be revised to address some of the questions raised and will go through public review. Further, cleanup standards will be developed as part of the Superfund reform effort which will go through the rulemaking process which includes significant public participation.

- 22. Comment:** Our major concern is that we do not have any confidence in the number as we did STARS. There is a concern over odors and leaving material above pre-release conditions that could easily have been achieved.

Comment: Each document has its own merits, and are not mutually exclusive. There is a need to provide better guidance for use of each regardless of the type of site. STARS should be

expanded to include other compounds listed in TAGM to provide appropriate guidance where the Department determines restoration is feasible.

Response: There are cases where TAGM is more stringent than STARS, such as with MTBE. The current STARS Alternative Guidance value for MTBE is 200 ppb. The current value in TAGM is 120 ppb which reduces to 48 ppb should the soil be near or extend into the water table.

TAGM may also require the attainment of lower levels via its total criteria. This can occur with semi-volatiles or weathered fuels. These insoluble contaminants may pass STARS but would fail the TAGM criteria for SVOCs. At least for the more toxic contaminants (benzene and carcinogenic PaH's) the numbers are virtually the same. Experience in the hazardous waste program with the numbers in TAGM has been favorable. Relative to odors, the same general language that is in STARS is in the TAGM - if the numbers are achieved and there still is an odor problem, additional removal or remediation may be necessary. Relative to pre-release conditions, neither TAGM or STARS are pre-release. Part 375 states a goal of returning to pre-release conditions to the extent feasible. The Navigational Law has essentially the same language. Both TAGM and STARS are guidance to implement the law or regulation.

Attachments

cc: T. Quinn

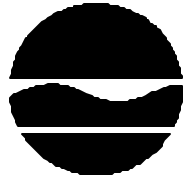
bcc: M. O'Toole

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Erin M. Crotty
Commissioner

MEMORANDUM

To: Bureau Directors, Section Chiefs, Regional Spill Engineers, Regional Hazardous Waste Remediation Engineers
From: Michael J. O'Toole, Jr, Director, Division of Environmental Remediation
Subject: Soil Cleanup Consolidation - Further Clarifications
Date: *signed July 10, 2001*

On December 20, 2000, guidance was issued that identified the soil cleanup objectives included in TAGM 4046 as the appropriate values to be used in determining soil cleanup levels at petroleum spill sites. The intent of this guidance was not to change the process of determining a remedy at petroleum spill sites, but only to substitute the soil cleanup objectives contained in TAGM 4046 for the numerical values in STARS #1. A number of comments resulted from the issuance of this guidance and on April 10, 2001, a Responsiveness Summary was issued to address those comments. Since that time, several additional comments and questions have been received. The purpose of this memo is to provide clarifications to those comments and questions and to clarify some responses provided in the April 10th summary. If there are additional questions, please contact Jim Harrington or Frank Peduto.

Item #1

A recurring question relates to the allowable actions concerning excavated soil at petroleum remediation sites (Response Summary Questions #1 and #14).

Response Excavated soil may be placed back in the hole or left at the surface on the site if levels are less than TAGM 4046 soil cleanup objectives. Excavated soil may be sent to offsite locations if levels are less than STARS#1 Guidance Values and the material is used in accordance with the predetermined beneficial uses defined in the STARS guidance document. In summary, TAGM is used for onsite soil disposal and STARS is used for offsite soil disposal.

Item #2

Can I adjust the TAGM criteria based on revised groundwater standards?

Response Yes. While the TAGM itself cannot be changed without going through the entire policymaking process, soil cleanup levels can be adjusted for those compounds where the groundwater standards have changed. The manner in which soil cleanup objectives are calculated is contained in the TAGM and specifies use of the groundwater standard. Recomputing the soil cleanup objective based on

groundwater standards which have changed since the TAGM was issued is appropriate. An example is benzene. When TAGM was issued in 1992, the groundwater standard for benzene was 0.7 ppb which resulted in a recommended soil cleanup objective of 0.06 ppm. The groundwater standard was changed to 1 ppb which results in a soil cleanup objective of 0.08 ppm. This revised level may be used.

Item #3

Will tertiary butyl alcohol (TBA) be added to the petroleum list of compounds of concern?

Response While TBA is not a contaminant routinely sampled for at petroleum spill sites, the Department is reviewing its investigative protocols with regard to TBA and other oxygenates. Upon completion of the review a determination will be made whether to include TBA and other oxygenate compounds to the list of sampled compounds of concern.

Item #4

Several commenters questioned Response #16 with regard to low levels of contamination being moved from one location to another.

Response That response referred to common fill from construction sites and not soil removed from petroleum spills.

Item #5

With the changeover to TAGM 4046 what is the status of the exposure guidance values previously used by the Spill program?

Response When in-situ petroleum contaminated soil could not meet STARS, remedial activities at the site could still be terminated if exposure guidance criteria provided by the Bureau of Spill Prevention and Response were met. After comparing the TAGM 4046 soil cleanup objectives with the exposure guidance values, we found the TAGM to be equal to, and in some cases, more stringent than the exposure values. There were only a few that were less stringent and those by an insignificant amount. Therefore, with the adoption of the TAGM 4046 values, the exposure guidance values will no longer be used.

If, after site investigation and remediation, (free-product, source removal and residual contamination to the extent practicable), have been completed and the residual levels still exceed the TAGM soil cleanup objectives, a qualitative exposure assessment must be conducted. This assessment consists of evaluating exposure pathways to determine if they present an opportunity for contaminant migration. It may be necessary to conduct a more quantitative assessment (e.g. soil gas survey) to confirm that exposures are acceptable. The Department of Health may be consulted regarding exposures. If there are no unacceptable exposures, remediation activity at the site may be terminated.