

Slow Release Fertilizer Summit

Bellevue, WA
 Sunday August 6, 2017
 3:30 - 5:30 pm

Objectives:

- Bring together all committees associated with SR/CR/EE fertilizer to develop a clear path moving forward.
- Develop SR and CR terms for consideration by T&D.
- Review policy statements, SUIPs, rules, footnotes, etc. for consideration by Model Bills.
- Review impact of changes on industry and propose time-line for implementation.
- Determine if there any unresolved issues and develop a plan to address them.
- Discuss role of Advisory group and its activation.
- Develop a plan and timeline.

Objective 1: Discuss proposed terms (25 min):

T-71€* Slow Release Fertilizer - A fertilizer containing a plant nutrient in a form which delays its availability or its conversion to a plant available form for plant uptake and use (*in an agronomically effective manner*) after application, or which extends its availability to the plant (*in an agronomically effective manner*) longer than a reference “readily available nutrient fertilizer” product such as ~~ammonium nitrate or urea~~, ammonium phosphate or potassium chloride. Such delay of initial availability or extended time of continued availability may occur by a variety of mechanisms. These include controlled water solubility of the material (by semi-permeable coatings, occlusion, or by inherent water insolubility of polymers, natural nitrogenous organics, protein materials, or other chemical forms), by slow hydrolysis of water soluble low molecular weight compounds, or **by other recognized means**. Controlled release fertilizers (T-103) are slow release fertilizers that have characteristics that allow nutrients in the product to be released over a known timeframe under controlled conditions.

Comments (abbreviated)

Sandy Simon - We believe the highlighted wording below “**..or which extends its availability to a plant...**” needs to be removed from the definition. This language could be used to argue that Stabilized Fertilizers are Slow Release Fertilizers. Please note the similarity to the definition of T-41 Stabilized Fertilizer – “A fertilizer product that has been amended with an additive that reduces the rate of transformation of a fertilizer compound(s), **extending the time of nutrient availability** to the plant by a variety of mechanisms relative to its un-amended form. (Official 2014)

Michael Hojjatie – agrees with Sandy’s comment

Doug Sell – also agrees with Sandy

Jim Jenkins - I think changes in addition to taking “or which extends its availability to the plant” out will have to be made to the proposed SR definition to distinguish from stabilized fertilizers. The first sentence reads, ‘A fertilizer containing a plant nutrient in a form which delays its availability...’ (presumably this means availability in the soil as a water soluble nutrient but perhaps not yet in a plant available form) ‘or its conversion to a plant available form for plant uptake and use...’ (is this not what a stabilized fertilizer does, retard the conversion of a nutrient to a plant available form?)

Because the sentence is structured as an either/or statement, a polymer coated, sulfur coated or occluded product all of which delay the availability of a water soluble nutrient (water soluble or not) in the soil or a water soluble fertilizer with inhibitor applied to its surface which would delay the conversion of a nutrient to a plant available form, would by definition, be considered two different forms of slow release fertilizers.

Ed Thomas – why remove ammonium nitrate from definition (it is part of ISO)?

Alan Blaylock

I’m not overly fond of the phrase “(in an agronomically effective manner)”. I think we’re going to have to provide more exacting detail in a policy statement that we simply can’t put in a definition. I think the conflict lies mostly in allowing **all** slow-release to be called enhanced efficiency. ... the intent of the EEF definition – increasing availability/uptake and reducing losses – is clearly to [have an] effect on the immediate crop of concern. I would like to see language to that effect somewhere but, I think probably not in this definition.

Inclusion of the last sentence “Controlled release fertilizers (T-103) are slow release fertilizers that ...” in the SR definition... think adds unnecessary length to the SR definition and is not needed. I know well the concern, but this is stated clearly in the proposed new CR definition. Adding it to the SR definition is redundant and doesn’t add any additional clarification that is not already covered in the proposed CR definition. I’m in favor removing this sentence. It can also be reiterated in the policy statements yet to be finalized.

James Bartos

I have a [concern about] the statement: **or by inherent water insolubility of polymers, natural nitrogenous organics, protein materials,** or other chemical forms) ... Regarding organic compounds, my understanding is their nutrient release is more of a function of microbial decomposition rather than a solubility issue? If so, consider: These include controlled water solubility of the material (by semi-permeable coatings, occlusion, **or by inherent water insolubility or by other chemical forms), of polymers, natural nitrogenous organics, protein materials,,** **by microbial release from organic nutrient compounds,** by slow hydrolysis ...

Lucia Villavicencio

In regards to SRF, in the case of coated fertilizers the coating does not decrease the solubility of the product but the rate at which it dissolves.

Eddie Simons

I am unable to support the definitions below. There is a significant amount of information that does not belong in a definition, there is a lot of unnecessary redundancy, and the examples just add to the complexity of the definitions. We could also build it up from the most basic definition and question everything that is added.

For example

- Simplest form
 - Slow released fertilizer – is a fertilizer that releases its nutrients to a plant-available form at a slower rate when compared to a reference soluble product.
- Add example reference soluble products
 - Questions – Is this necessary to define the product? Would we not know what could be used as a reference soluble product without these examples?
 - I believe that it is not necessary to give examples. The solubility of products is relatively well known in the industry. Companies that want to use the term “slow release fertilizer” would have to be able to show that their product does in fact release the nutrients at a slower rate than any other form of the same nutrient
- Adding longevity statement
 - Questions – Is this necessary to define the product? Is this the appropriate place to mention or mandate a longevity statement?
 - The longevity statement may be a label requirement, but does not help to define the term “slow release fertilizer”.
 - The option or requirement for a longevity statement should be put in a policy or model rule, not the definition.

Here are the definitions I propose:

T-71€* Slow Release Fertilizer - A fertilizer that contains one or more plant nutrients in a form which delays its availability or its conversion to a plant available form when compared to a reference soluble product. Types of slow release materials include 1) Water insoluble nitrogen, 2) Coated slow release fertilizers, 3) Occluded slow release fertilizers, and 4) Slowly available water soluble nitrogen.

Brian Birrenkott - I agree with Eddie's [regarding] content of a good definition: 1) Concise yet state the critical points. 2) Examples not needed if written using scientifically accepted terminology. 3) The term being defined cannot be used as part of the definition. I feel there are 3 critical points to define Slow Release Fertilizer: 1) Extended nutrient availability; 2) Effective release rate (rock phosphate not effective); 3) Variety of mechanisms. Following this logic, I respectfully submit the following minor revisions to Eddie's version:

T-71€* Slow Release Fertilizer - A fertilizer **material** that contains one or more plant nutrients in a form which delays its availability or its conversion to a plant available form when compared to a reference soluble product. ~~Types of slow release materials include 1) Water insoluble nitrogen, 2) Coated slow release fertilizers, 3) Occluded slow release fertilizers, and 4) Slowly available water soluble nitrogen.~~ **Nutrients become available at effective rates using physical, chemical, or biological means and combinations thereof.**

Sandy - I like Eddie's simplified approach, but believe it is a little too vague and need to clearly state that controlled release is a subset of slow release.

Jon Hartshorn – [I propose]: **T-71 Slow Release Fertilizers** - A fertilizer that contains one or more plant nutrients in a form which delays its availability, or its conversion to a plant available form, longer than a reference “readily available nutrient fertilizer” product, and is not classified as T-?? Crude or Inert Materials. Slow Release Fertilizers are a subset of Enhanced Efficiency Fertilizers (T-70)

James – abbreviate example or initial definition removing examples and incorporating several comments:

T-71€* Slow Release Fertilizer - A fertilizer containing a plant nutrient in a form which delays its availability or its conversion to a plant available form for plant uptake and use after application, longer than a reference “readily available nutrient fertilizer” product. Nutrients become available at effective rates using physical, chemical or biological means or combinations thereof. Controlled release fertilizers (**T-103**) are a type of slow release fertilizer engineered to provide nutrients over time at a predictable rate under specified conditions.

Comment: how do we classify a fertilizer that takes several years to release? Is it an EEF?

T103€* Controlled Release fertilizer: Fertilizer products that release nutrients at a **controlled predictable** rate **(under controlled conditions)** relative to an appropriate “reference soluble” product such as **ammonium nitrate** or urea, ammonium phosphate or potassium chloride, where a stated percentage of the nutrient is released at a stated nutrient release **rate or nutrient release** time under specified conditions. Controlled Release fertilizers are considered a subset of Slow Release fertilizers.

Comments (abbreviated)

Ed – why remove ammonium nitrate from definition? I cannot see if controlled release fertilizers must be released under specific time and rate conditions specified on the label or something like that. It's like taking a controlled release pill. No-one would take a pill where 90% would be released in first hour and 10% released over next 23 hours when it needs to be released evenly over 24 hours. Is this going to be part of the entire package?

James - I think [prequalifying CRFs as SRF's and shortening the definition] is an improvement. For example: **Controlled Release Fertilizer:** **A type of Slow Release** fertilizer product that release nutrients at a predictable rate (*under controlled conditions*) relative to an appropriate “reference soluble” product such as urea, ammonium phosphate or potassium chloride, where a stated percentage of the nutrient is released at a stated nutrient release time under specified conditions. ~~Controlled Release fertilizers are considered a subset of Slow Release fertilizers.~~ [However], you could state and predict the release of several fertilizer products, but that alone doesn't make them controlled release (i.e. they must also be slow).

Lucia - In my opinion the changes made addressed the concerns I had on CRF.

Eddie - I am unable to support the definitions below. (see comments for SRF). [I propose]: **T103€* Controlled Release Fertilizer:** Slow release fertilizers that release nutrients at a controlled rate (*under controlled conditions*) relative to an appropriate “reference soluble” product. Types of controlled release fertilizers include coated slow release fertilizers and occluded slow release fertilizers.

Brain – I feel there are 3 critical points to define CRF: 1) Specific type or subset of slow release; 2) Engineered [to provide] predictable, reliable release under defined conditions; 3) Inclusive of technologies that can deliver precise release under defined conditions. I respectfully submit the following minor revisions to Eddie's version:

T103€* Controlled Release Fertilizer: **A type of** slow release fertilizer **that is engineered to provide** release nutrients **over time** at a **predictable and reliable** ~~controlled~~ rate under **stated specific** ~~controlled~~ conditions. ~~relative to an appropriate “reference soluble” product. Types of controlled release fertilizers include coated slow release fertilizers and occluded slow release fertilizers.~~ **Release mechanisms may include physical, chemical, or biological means and combinations thereof.**

| | |
|--------------------------|-----|
| Total Nitrogen (N) | 10% |
| 2.5% Ammoniacal nitrogen | |
| 2.5% Nitrate nitrogen | |
| 5.0% Urea nitrogen* | |

* _____% Slowly Available Nitrogen From _____

(c) A fertilizer with two (2) or more nutrients from coated materials:

| | |
|--------------------------|-----|
| Total Nitrogen (N)* | 10% |
| 2.5% Ammoniacal nitrogen | |
| 2.5% Nitrate nitrogen | |
| 5.0% Urea nitrogen | |

| | |
|---|-----|
| Available Phosphate (P ₂ O ₅)* | 15% |
|---|-----|

| | |
|------------------------------------|-----|
| Soluble Potash (K ₂ O)* | 20% |
|------------------------------------|-----|

* The nitrogen, phosphate and potash materials in this product have been coated to provide 9% coated slow release nitrogen (N), 13% coated slow release available phosphate (P₂O₅) and 18% coated slow release Soluble Potash (K₂O). (Official 1994).

SUIP 21. Slowly Available Water Soluble Nitrogen – When a fertilizer material or fertilizer mixture contains recognized and determinable forms of water soluble nitrogen with slowly available properties, then the guarantees for those components, if claimed, should be shown as footnotes rather than as a component in the nitrogen breakdown. For example:

Abbreviated:

| | |
|---|-----|
| Total Nitrogen (N) | 20% |
| 8% Urea Nitrogen | |
| 2% Other water soluble Nitrogen | |
| 2.9% Slowly Available Water Soluble Nitrogen* | |
| 7.1% Water Insoluble Nitrogen | |

* _____% Slowly Available Nitrogen from _____

Objective 4: Discuss Rule 3 (OP #70, p. 48) (15 min):

3. Slowly Released Plant Nutrients.

(a) No fertilizer label shall bear a statement that connotes or implies that certain plant nutrients contained in a fertilizer are released slowly over a period of time, unless the slow release components are identified and guaranteed at a level of at least 15% of the total guarantee for that nutrient(s). (Official 1991)

3. Slowly Released Plant Nutrients, [Enhanced Efficiency Fertilizers]

(a) No fertilizer label shall bear a statement that connotes or implies that [the fertilizer is an enhanced efficiency fertilizer, or that it is a slow release fertilizer, or that it is a controlled release fertilizer, or that it is a stabilized fertilizer, or that] certain plant nutrients contained in a fertilizer are released slowly over a period of time, [or that certain plant nutrients are available for a longer period of time, or that potential nutrient losses to the environment are reduced,] unless the [enhanced efficiency fertilizer materials] slow release components are identified and [slow- or controlled-release] guaranteed at a level of at least 15% of the total guarantee for that nutrient(s) [and/or stabilized components applied at the labeled rate on the base material.] (Official 1991)-[Tentative 2017]

Note: 15% Rule is being discussed by Academic Advisors (wait to change???)

b) Types of products with slow release properties recognized are (1) water insoluble, such as natural organics, ureaform materials, urea-formaldehyde products, isobutylidene diurea, oxamide, etc., (2) coated slow release, such as sulfur coated urea and other encapsulated soluble fertilizers, (3) occluded slow release, where fertilizers or fertilizer materials are mixed with waxes, resins, or other inert materials and formed into particles and (4) products containing water soluble nitrogen such as ureaform materials, urea formaldehyde products, methylenediurea (MDU), dimethylenetriurea (DMTU), dicyanodiamide (DCD), etc. The terms, "water insoluble", "coated slow release", "slow release", "controlled release", "slowly available water soluble", and "occluded slow release" and are accepted as descriptive of these products, provided the manufacturer can show a testing program substantiating the claim (testing under guidance of Experiment Station personnel or a recognized reputable researcher acceptable to the _____). A laboratory procedure, acceptable to the _____ for evaluating the release characteristics of the product(s) must also be provided by the manufacturer. (Official 1991)

~~b) Types of products with slow release properties recognized are (1) water insoluble, such as natural organics, ureaform materials, urea formaldehyde products, isobutylidene diurea, oxamide, etc., (2) coated slow release, such as sulfur coated urea and other encapsulated soluble fertilizers, (3) occluded slow release, where fertilizers or fertilizer materials are mixed with waxes, resins, or other inert materials and formed into particles and (4) products containing water soluble nitrogen such as ureaform materials, urea formaldehyde products, methylenediurea (MDU), dimethylenetriurea (DMTU), dicyanodiamide (DCD), etc. The t [T]erms, [such as] "water insoluble", "coated slow release", "slow release", "controlled release", "slowly available water soluble", and "occluded slow release" and are accepted as descriptive of these products, provided the manufacturer can show a testing program substantiating the claim (testing under guidance of Experiment Station personnel or a recognized reputable researcher acceptable to the _____). A laboratory procedure, acceptable to the _____ for evaluating the release characteristics of the product(s) must also be provided by the manufacturer. (Official 1991) [Tentative 2017]~~

(c) Until more appropriate methods are developed, AOAC International Method 970.04 (15th Edition) is to be used to confirm the coated slow release and occluded slow release nutrients and others whose slow release

characteristics depend on particle size. AOAC International Method 945.01 (15th Edition) shall be used to determine the water insoluble nitrogen of organic materials. (Official 1994)

(Official 1994)

(c) Until more appropriate methods are developed, AOAC International Method 970.04 (15th Edition) **[and/or AOAC International Method 2016.15 (20th Edition), as appropriate,]** is to be used to confirm the coated slow release and occluded slow release nutrients and others whose slow release characteristics depend on particle size. **[AOAC International Method 2016.15 (20th Edition) shall be used to confirm longevity claims of controlled release fertilizers.]** AOAC International Method 945.01 (15th Edition) shall be used to determine the water insoluble nitrogen of organic materials. **[AOAC Official Method 2003.14 (official 2008) shall be used for the determination of free urea in urea-triazone and other water soluble fertilizers. (Tentative 2017)]** (Official 1994)

Objective 5: Discuss SUIP 30 (OP #70, p. 72) (10 min):**30. Enhanced Efficiency Fertilizers – [N, P, K, Secondary & Micronutrient]**

These fertilizers can achieve improved efficiency use and minimize the potential of nutrient losses to the environment. They achieve this through mechanisms that slow the release of plant available nutrients into the soil (or growth media), or extend the time that available nutrients remain in the soil (or growth media). Additionally, future technologies may accomplish these same results by altering nutrient delivery or chemistry by other means to be determined and approved by AAPFCO.

Only nutrient forms that have approved EEF properties can use the EEF term on labeling. In order to use EEF on the label, an approved mechanism for attaining the enhancement must be stated in the AAPFCO term or product definition.

EEF - To make an 'Enhanced Efficiency Fertilizer' claim for a fertilizer, manufacturers must:

- Reference an ingredient with an approved EEF mechanism or property as denoted by an '€' in the official terms and definitions section of the most current AAPFCO Official Publication.
- State the quantity **[percentage]** of the approved **[slow- or controlled-release]** EEF component on the label. **[This must be at least 15% of the total nutrients.]** AAPFCO definition names with the symbol **“#”[€]** identify a product **[(s) or ingredients]** permitted to claim EEF properties. ~~(Official 2014)~~

[• Apply stabilizers at the labeled rate on the base material.]

[• Have at least one primary nutrient (N, P, or K) to qualify as an EE fertilizer (Tentative 2017)]

BREAK – 10 min**Objective 6: Discuss some loose ends (15 min):**

1. For SRF, how slow is slow?
2. EEF – must an EEF contain slow, controlled or stabilized N and/or P? What if a complete fertilizer, with no slow or controlled or stabilized N, P or K, but contains some slow release Iron, by virtue of limited solubility, does this qualify as an EEF? What if it's a micronutrient fertilizer?

Objective 7: Discuss Slow Release and Stabilized Fertilizer Policy Statement (time permitting):

(OP # 70, p. 164)

Current:

Policy Statement Slow Release and Stabilized

Upon review and consultation with the industry in early 1994, the Association of American Plant Food Control Officials (AAPFCO) concluded that its model legislation for slow release fertilizers, including some products with specific stabilizing characteristics, was not adequate or well understood. These products achieve improved efficiency of nutrient use and minimize the potential of nutrient losses to the environment through mechanisms

that slow the release of plant available nutrients into the soil or extend the time that available nutrients remain in the soil These products as a class provide important tools in environmentally responsible plant nutrition; therefore, increased use and market share for these products In the next few years is predicted, especially in agricultural crop markets.

AAPFCO affirms that one of the goals of its model legislation is to provide for consumer protection while encouraging free commerce. Pursuant to this goal, AAPFCO endorses and recommends that:

Proposed:

Policy Statement ~~Slow Release and Stabilized~~ **Enhanced Efficiency** Fertilizers (p.164 OP 70)

~~Upon review and consultation with the industry in early 1994, [In reviewing recent advances in nutrient use efficiency,] the Association of American Plant Food Control Officials (AAPFCO) concluded that [updates were needed to] its model legislation[, policies, and definitions] for slow release fertilizers, including some products with specific stabilizing characteristics, was not adequate or well understood. [that offer the potential for improved nutrient use efficiency.] These products [may] achieve improved efficiency of nutrient use and minimize the potential of nutrient losses to the environment through mechanisms that slow the release of plant available nutrients into the soil or extend the time that available nutrients remain in the soil These products as a class provide important tools in environmentally responsible plant nutrition; therefore, increased use and market share for these products In the next few years is predicted, especially in agricultural crop markets[of these products is anticipated].~~

AAPFCO affirms that one of the goals of its model legislation is to provide for consumer protection while encouraging free commerce. Pursuant to this goal, AAPFCO endorses and recommends that:

Current:

- (1) The term "Enhanced Efficiency (EE)" be adopted to describe fertilizer products with characteristics that minimize the potential of nutrient losses to the environment, as compared to a "reference soluble" product.

Proposed:

- (1) The term "Enhanced Efficiency **Fertilizer** (EE**F**)" **should** be adopted to describe fertilizer **materials or fertilizer** products with characteristics that **allow increased nutrient availability and reduced** minimize the potential of nutrient losses to the environment, **e.g. gaseous losses, leaching or runoff, when** as compared to a "reference soluble" product.

Current:

- (a) The term "slow release" be adopted to describe fertilizer products that release (convert to a plant-available form) their plant nutrients at a slower rate relative to a "reference soluble" product. Examples of slow release products are coated or occluded, which control the release of soluble nutrients through coating or occlusion of the soluble nutrient compounds, water insoluble, or slowly available water soluble.

Proposed"

- (a) The term "slow release" be adopted to describe fertilizer products that release (convert to a plant-available form) their plant nutrients at a slower rate relative to a "reference soluble" product. Examples of slow release products are coated or occluded, which control the release of soluble nutrients through coating or occlusion of the soluble nutrient compounds, water insoluble, or slowly available water soluble. **[This may be accomplished by biodegradation, and/or by limited solubility, and/or hydrolysis and/or coatings or occlusions or other recognized chemical, biological or physical means.]**

Proposed (new):

- [(b) The term "controlled release" be adopted to describe a subset of slow release EEFs that release (convert to a plant-available form) nutrients at a controlled rate relative to an appropriate "reference soluble" product, meeting a stated nutrient release rate or stated nutrient release time under specified conditions. An example of a controlled release product is polymer coated fertilizer that controls the release of nutrients by diffusion of the nutrient through the polymer coating.]**

Proposed (new):

- [(c) Mention of listing of slow-release fertilizers in fertilizer rules and regulations is considered to be inclusive of either slow- or controlled-release materials.]**

Proposed (only a single word change):

- [(d)]** The term "stabilized" be adopted to describe products **[EEFs]** that have been amended with an additive that reduces the rate of transformation of fertilizer compounds, resulting in extended time of availability in the soil. Examples of stabilizing amendments are nitrification inhibitors, nitrogen stabilizers or urease inhibitors.

Proposed (new):

- [(2)] All controlled release products are slow release, but not all slow release products are controlled release. The term "controlled release" may only be used to describe those products that make a longevity claim and meet a stated nutrient release rate or stated nutrient release time under specified conditions.]**

Items Remaining the Same (except change in page number and date to Tentative):

- (2) ~~[(3)]~~ The EE characteristics of these products be described in a consistent and quantifiable manner.
- (3) ~~[(4)]~~ The AAPFCO, through its body of model legislation, develop and promote simple and effective regulatory procedures for EE fertilizer products These should include (a) identification of methodology for determining "release rate" or "transformation rate" that is straight-forward and universally accepted; (b) development of definitions and labeling requirements that conform with this policy statement, and that are readily understood and supported by industry; (c) development of guidelines for consistent and effective enforcement of regulations for EE products; and, (d) flexibility to include future product concepts and technology that may be developed end brought to market.

Successful implementation of these recommendations will require efforts by both AAPFCO and industry. AAPFCO should move as quickly as possible, working with industry, to revise its model legislation to conform with the recommendations and objectives of this policy statement. Industry should actively support the development and adoption of testing procedures and analytical methods that conform with the requirements of this policy. Both AAPFCO and industry should promote adoption throughout North America. AAPFCO believes that adoption of this policy is consistent with its regulatory mission and with its commitment to ensuring that fertilizer users receive high quality, clearly labeled and efficacious products. (Tentative 2017)