

**ENHANCED EFFICIENCY FERTILIZERS  
AAPFCO'S EFFORTS AND PERSPECTIVE**

**James Bartos,  
Purdue University  
Office of Indiana State Chemist**

## AAPFCO'S ROLE

- AAPFCO = *Association of America Plant Food Control Officials*
- Established 1946
- Voting members are state control officials, but meetings open to industry liaisons
- Mission = *to establish uniform standards that promote consumer protection, environmental stewardship, and provide a forum to achieve regulatory consensus*
- Revenue – registration fees and tonnage fees
- NRCS Nutrient Management Code 590 (May 2019) stipulates “For enhanced efficiency fertilizer (EEF) products, ***use products defined by the Association of American Plant Food Control Officials as EEF*** and recommended for use by the State LGU” (Land Grant University).
- EE topics fall into our Slow Release Committee and are **ongoing**
- Many of our terms, rules and polices can be found in our ***Official Publication (OP)***

# HOW DOES AAPFCO DEFINE EEF?

- **T – 70 Enhanced Efficiency Fertilizer**

- *Describes fertilizer products with characteristics that allow increased nutrient availability and reduce potential losses to the environment e.g., gaseous losses, leaching or runoff when compared to an appropriate reference product.*

- **Critical criteria:**

1. **allow increased nutrient availability** (direct – provide more, or indirect – retain more)
2. **reduce potential losses to the environment**
3. **compared to an appropriate reference product**

- **T – 84 Enhanced Efficiency Reference Product**

- *The soluble fertilizer product (prior to treatment by reaction, coating, encapsulation, addition of inhibitors, compaction, occlusion, or by other means) or the corresponding product used for comparison to substantiate enhanced efficiency claims.*

## **SOME BENEFITS OF EE CLASSIFICATION**

- Eligible for NRCS Nutrient Management 590 cost sharing
- Some “local” ordinances require the use of an EEF
- Potential benefit(s) to the environment
- A consumer preference, by some

# RELEVANT AAPFCO OP REFERENCES

- SUIP 17 – Coated Slow Release or Occluded Slow Release Nutrients
  - includes labeling examples (some also found in AAPFCO labeling guide)
- SUIP 21 – Slowly Available Water Soluble Nitrogen
- SUIP 30 – Enhance Efficiency Fertilizers – [N, P, K, Secondary and Micronutrient]
- Rule 3 – Slowly Released Plant Nutrients
  - (a) “15% Rule”
  - (b) types of products with recognized slow release properties
- Slow Release and Stabilized Fertilizers Policy Statement
- T-70: Enhanced Efficiency Fertilizer
- T-84: Enhanced Efficiency Reference Product
- Footnotes
  - € - ingredient with approved EEF mechanism
  - # - identifies product permitted to claim EEF properties
  - \* - has slow release property

## RECOGNIZED SR PROPERTIES – RULE 3 (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" 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)

# PRODUCT LISTINGS

Identifier	Symbol	Term or Definition
N-37	#	Ammonium Thiosulfate
Cu-9	#	Copper Frits
N-12	#	Cyanamide (Lime Nitrogen) (nitrification inhibitor)
N-31	#	DCD Dicyandiamide (cyanoguanidine) (nitrification inhibitor)
N-30	#	Dimethylenetriurea (DMTU) (slowly available nitrogen)
T-123	€ #	Duromide (urease inhibitor)
N-62	*	Feather Meal
Fe-8	#	Iron Frits
N-26	#	Isobutylidene Diurea (slowly available nitrogen)
P-23	#	Magnesium Ammonium Phosphate (slowly available N, Mg and Phosphate)
P-24	#	Magnesium Potassium Phosphate (slowly available Potash, Mg and Phosphate)
Mn-8	#	Manganese Frits
N-40	#	Methylene Urea (MU polymethylene urea(s)) (slowly available nitrogen)
N-29	#	Methylenediurea (MDU) (slowly available nitrogen)
T-46	#	NBPT N-(n-butyl)thiophosphorictriamide (urease inhibitor)
T-99	#	Nitrapyrin [2-Chloro-6-(trichloromethyl)pyridine] (nitrification inhibitor)
N-36	#	Oxamide (slowly available nitrogen)
N-32	#	Polymer Coated urea (PCU)
T-122	€ #	Pronitridine (nitrification inhibitor)
N-27	#	Sulfur Coated Urea (SCU)
S-13	#	Sulfur(S) < 100 microns
N-33	#	Triazone (slowly available nitrogen)
N-24	#	Ureaform Fertilizer Materials (sparingly soluble)
N-25	#	Urea-Formaldehyde Products (sparingly soluble)
N-35	#	Urea-Triazone Solution
Zn-9	#	Zinc Frits

# GENERAL LISTINGS OR CATEGORIES

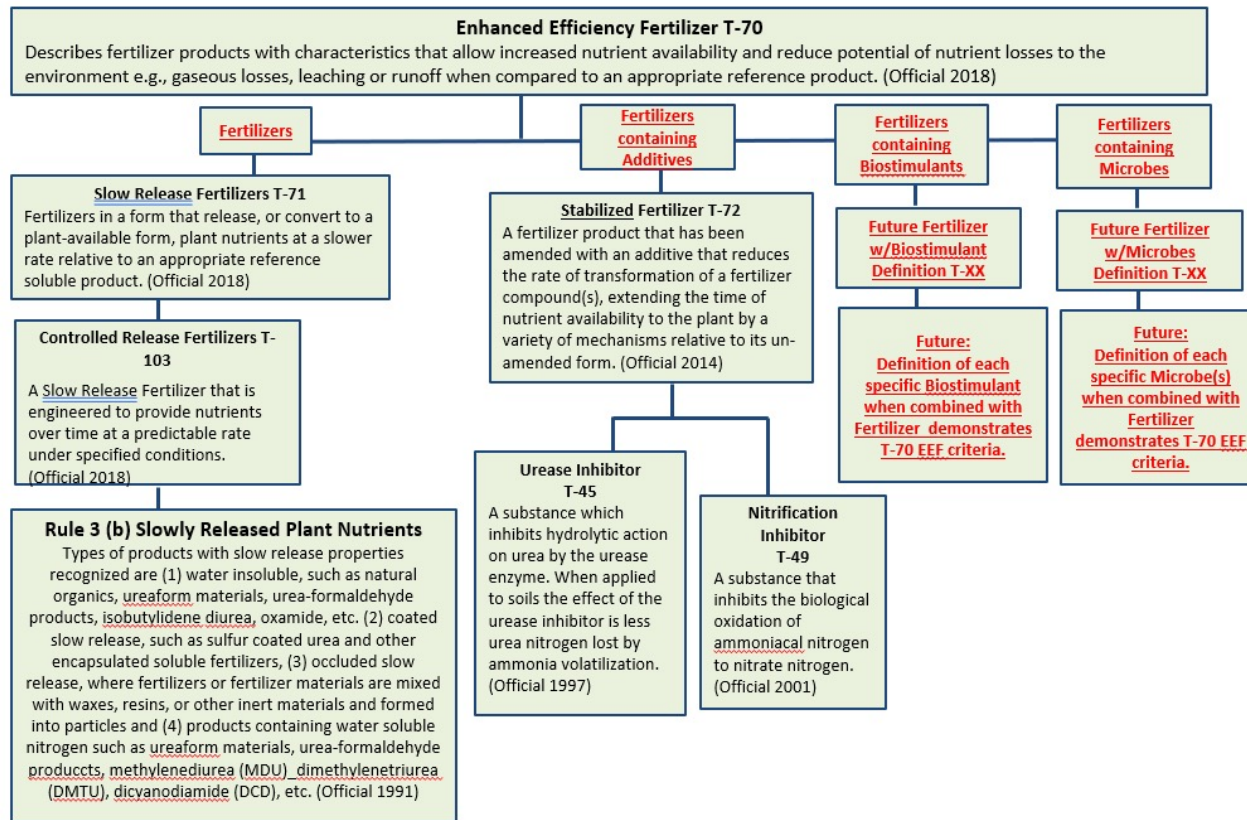
Identifier	Symbol	Term or Definition
T-48	#	Biosolids
N-22	#	Crude, Inert, or Slow-Acting Nitrogenous Materials
T-21	€	Coated Slow Release Fertilizer
T-49	#	Nitrification Inhibitor
T-32	€ #	Polymer Coated Fertilizer
N-19	#	Processed Tankage
T-72	#	Stabilized fertilizer
T-41	€ #	Stabilized Nitrogen Fertilizer
T-45	€	Urease Inhibitor

- Overall:
  - 35 listings in the AAPFCO OP
  - 24 of 35 (69%) deal exclusively with Nitrogen
  - A few terms/definitions pertain to other primary, secondary and/or micro products
  - Could be more, but some have not gone through the recognition process



# FLOWCHART

## Relationship Between Enhanced Efficiency Fertilizers Terms



- **DRAFT**
- QUICK reference guide
- **NOT automatic** as must meet criteria
  - *double check if any symbol(s) assigned to term*

# RECOGNITION PROCESS

- Requirements:
  1. **Term or Definition**
  2. **Efficacy Data** – comparison with reference soluble product; e.g., nutrient release curves; uptake; yield/production; less nutrient loss to environment, etc. to support claims
  3. **Laboratory Test Method** – to confirm presence and amount
- Information is reviewed by expert review panel
- Panel makes recommendation to applicable committees
- Can “pull-in” expertise
  - Academic advisors
  - MOU with tri-societies
  - Limited involvement with USDA and EPA

# UNRESOLVED

- How much EE in product is required to make EE claims?
  - SR – have Rule 3 or 15%; what about other products?
  - “*Right Rate*” – apply at rate that will have the desired impact
  - What if a single nutrient product?
  - What if a multi-nutrient product or blend?
- What type(s) of efficacy information or data is required to demonstrate EE?
  - Or is “*we’ll know it when we see it*” sufficient
- Focus has mainly been on Nitrogen and Phosphate. What about other nutrients?
  - Clarification needed from USDA?
- T-71 SR - more clearly define “slower rate” and similarly, what is too slow?
  - “... at a **slower rate** relative to an appropriate reference soluble product.”
- T-70 EEF - “when compared to an appropriate reference product” what are the comparison criteria?
- Geographic or environmental conditions?
- Any concern about “degrees” of Enhanced Efficiency?
  - (i.e., relative effectiveness, some products consistently and highly effective, some conditionally or less so)

# CONTACT

- Suggestions or questions are welcomed at:
- James Bartos
- Email: [jbartos@purdue.edu](mailto:jbartos@purdue.edu)
- Phone: 765-494-1560
- Additional Information available at AAPFCO's Website: [www.aapfco.org](http://www.aapfco.org)