Fertilizer Research and Education Program (FREP) Project Proposal

A. Cover Page

1. Project Leaders

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2. Cooperators

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3. Supporters

Barry Powell, CALAMCO: CALAMCO is a California-based cooperative that produces and distributes fertilizer products. Made up of approximately 1500 grower-members from throughout California, CALAMCO has been an advocate for fertilizer and plant nutrient education. This project, if successfully funded, will provide an accurate, consumer-friendly tool for educating youth and teachers about the fertilizer industry.

Jean Landeen, Coordinator of Agriculture Literacy and Awareness, California Department of Education (CDE): The purpose of CDE is to lead and support the continuous improvement of student achievement, with a specific focus on closing achievement gaps. This project aims to provide standards-based, science-focused resources for elementary and secondary educators, as well as professional development tools and trainings. The objectives of this project will indeed support CDE's core purpose of increasing student achievement and closing achievement gaps.

Jeff Rasmussen, Agrium Inc.: As a leading manufacturer of plant nutrients, Agrium supports nutrient stewardship and Best Management Practices. This means nutrients are applied in the correct amount, place and time, and using the correct product. Working with growers, Agrium teaches them how nutrients can be best applied to reduce greenhouse gas emissions and losses to water. Agrium supports educational materials that reinforce this important message about environmental stewardship and nutrient management.

4. CDFA Funding Request Amount/Other Funding

a. Funding request: $50,000 (2011) and $50,000 (2012)
b. If selected to receive FREP funds, California Foundation for Agriculture in the Classroom will provide $7,195 in matching funds to successfully complete the proposed project.

B. Executive Summary

1. Problem

California is the leading agricultural producer in the United States. As our population increases and farmland disappears to commercial and residential development, it is becoming increasingly important for farmers and ranchers to produce food, clothing, forest and floral products on less land for more people. Fertilizer plays a crucial role in improving agriculture efficiency. Students are part of our consumer population and will be our leaders and decision-makers in the future. It is essential, for the vitality of our industry, to educate young people about fertilizer's role in agriculture and empower them to make informed decisions as they mature to adults. There is a tremendous need for teacher resources that address the challenges facing agriculture and the plant nutrient industry's role in overcoming some of those challenges, our role in environmental stewardship and care, and the science behind agriculture production. The proposed curriculum will address these topics while meeting the Content Standards for California Public Schools.

2. Project objectives, approach and evaluation

The project objectives include the following:

- Create a new comprehensive, multi-lesson unit that will educate students in grades 8-12 about the relationships between fertilizers, food, plant nutrition and the environment.
- Update and align the already existing unit *What Do Plants Need to Grow?* for grades 2-4
- Develop five "Grab 'n' Go" teacher training kits that will be used to introduce teachers to the above-mentioned curriculum and encourage them to implement the curriculum into their classrooms.
- Increase student understanding of the essential role of plant nutrients in agriculture production.
- Enhance student appreciation of the agriculture industry's efforts to improve environmental stewardship.
- Encourage students to pursue a career in plant sciences.

Curriculum will be developed by the project directors and a team of educators selected from CFAITC's extensive network, based on experience and expertise. Industry experts from supporting organizations, such as the California Fertilizer Foundation and CALAMCO will also be invited to serve on the writing team. The selected group reviews and discusses the topics to be addressed within the unit, investigates the facts, collaborates with other agriculture industry professionals, and develops a rough draft of lesson plans. Following the development meeting, project directors will oversee layout and design, pilot testing, technical review, proof editing and curriculum dissemination.

During development, the curriculum will be piloted in four California classrooms. Teachers who pilot the lesson will be asked to provide feedback via written questionnaire about the curriculum. This evaluation will be used to improve the resource and assure project success. Upon completion of the project, CFAITC will evaluate by means of an established annual survey. The online survey will be used to measure the project's stated objectives to: 1) Increase student understanding of the essential role of plant nutrients in agriculture production; 2) Enhance student appreciation of the agriculture industry's efforts to improve environmental stewardship and 3) Encourage students to pursue a career in plant sciences. Educators will access the survey online and be asked to evaluate many of CFAITC's programs, including the fertilizer curriculum.

3. Audience

Curriculum developed through FREP funds could potentially reach all of California's 293,000 educators. Materials will be available to all educators at no-cost, therefore providing an equal opportunity for all California elementary and secondary educators to benefit from this project. Teachers of students in grades two through four (updated unit) and eight through 12 (new unit) will be specifically targeted through standards alignment. This project also has the potential to reach urban populations and those who know very little about food production.

C. Justification

1. Problem
As a $36 billion industry, California agriculture production continues to lead the nation. Challenges within the industry are numerous and California producers continually investigate the solution to a growing population and shrinking resources. With these challenges in mind, it is increasingly important for farmers and ranchers to produce food, clothing, forest and floral products on less land for more people. Fertilizer plays a crucial role in improving agriculture efficiency.

Students are a significant audience within our consumer population, and will be our leaders and decision-makers in the future. It is essential, for the vitality of our industry, to educate young people about fertilizer's role in agriculture and empower them to make informed decisions as they mature to adults. There is a tremendous need for teacher resources that address the challenges facing agriculture, and educate the public—in this case students in grades two through twelve—about the delicate balance between maximizing production and minimizing environmental impacts, while meeting the Content Standards for California Public Schools for chemistry curricula.

2. CDFA/FREP goals
The proposed project addresses the FREP key research area "education and public information." This project will fulfill this specific key research area by creating and implementing educational activities that result in adoption and appreciation of fertilizer management, practices and technologies. The development of educational material about the role fertilizer plays in our society will educate students, teachers and the general public about the relationships between fertilizers, food, nutrition and the environment.

3. Impact
Over the past 24 years, CFAITC has successfully developed and distributed curriculum to millions of educators. The proposed curriculum project will impact teachers, students, and consumers who will be exposed to materials that foster an appreciation for responsible agriculturists and the role plant nutrients play in agriculture production.

This project will significantly benefit teachers and students. Teachers across the nation will have unlimited, free access to the developed fertilizer curriculum. Developed by educators and reviewed by industry experts, the proposed curriculum will offer teachers a new, engaging way to teach problem-solving and critical thinking skills in all academic disciplines while familiarizing students with California's crop production. This project has the potential to impact all of California's 7 million public, private and charter school students. In 2009, CFAITC's most popular education unit reached 40,000 teachers. Undoubtedly, the updated curriculum (*What Do Plants Need to Grow?*) and new curriculum (*Chemistry, Fertilizer and the Environment*) development will generate similar interest among educators.

This comprehensive outreach plan will provide a unified message to Californians on behalf of all California farmers and ranchers. Out of the state's 81,500 farms and ranches, many depend on fertilizers to maintain profitable production. California fruit, nut, floriculture, field and vegetable crops represent approximately $28 billion in market value. The quantitative value of a consumer-friendly outreach message is immeasurable.

4. Long-term solutions
With the goal to increase student understanding of the essential role of plant nutrients in agriculture production and enhance student appreciation of the agriculture industry's efforts to improve environmental stewardship, this project will provide subtle yet significant long-term progress towards solving industry challenges. By teaching students about plant nutrients, responsible application, and related benefits, students will achieve an accurate and broad knowledge base about agriculture

production. California producers will benefit as “consumers-to-be” respond to positive outreach messages through their spending habits and decision making.

In addition, by familiarizing students with and providing real-life educational experiences related to plant nutrients, environmental stewardship and agriculture production, this project aims to interest students in life science and encourage students to pursue careers in plant sciences. Long-term, the agriculture industry will benefit from an increased number of young people pursuing plant science-related degrees and beginning academic careers with an established foundation of knowledge.

5. Related research and education efforts

In September 1994, CFAITC utilized FREP funds to produce and distribute *The Chemistry of Fertilizers*, a five-lesson unit teaching students to make their own fertilizer, analyze fertilizers for phosphate content and understand fertilizer labeling. This unit is still being used and supported today, with more than 4,500 copies downloaded from the CFAITC website in 2009.

The California Fertilizer Foundation provided funds in 2004 to develop Agriculture Fact Sheets for three main plant nutrients—nitrogen, phosphorous and potassium. These fact sheets explain basic information about the benefits of applying plant nutrients and the fertilizer industry, and provide activities and lesson plan ideas for teachers. In 2009, the Plant Nutrient Fact Sheets were download more than 10,000 times each, and continue to be CFAITC’s most popular fact sheet topic.

In 2007, CFAITC developed a 16-page newspaper tab, *What’s Growin’ On?* which also focused on fertilizer use and labeling. The newspaper was distributed to 500,000 students, educators and consumers, receiving praise for increased public understanding of fertilizers and agriculture. Based on CFAITC’s experience with previous fertilizer education efforts, we can conclude that teachers are hungry for more information about this topic.

6. Contribution to knowledge base

This project will significantly increase the knowledge base of both teachers and students. The proposed development and expansion of fertilizer education lessons, within the broader context of the subject of chemistry, would serve as a powerful and informative means of connecting California students to the importance of plant health, as well as the agriculture industry in general.

Teachers and students alike will develop a greater knowledge base about plant nutrients, fertilizer use practices, and the care that goes into producing our abundant food supply. The target audience will also gain important knowledge about how nutrients can be responsibly applied to reduce greenhouse gas emissions and losses to water. At the same time, lessons will reinforce traditional academic knowledge and skills by addressing the content standards for California public schools. This project will provide a significant resource for the thousands of California educators curious about the science and technology behind agriculture production.

7. Grower use

The proposed project will greatly benefit growers. This comprehensive outreach plan strives to strengthen the educational infrastructure for California agriculture and provide a unified message on behalf of all California farmers and ranchers. Growers across the state will reap the benefits of increased student understanding of the essential role of plant nutrients in agriculture production and enhanced student appreciation of the agriculture industry’s efforts to protect our air, water and soil quality. Overtime, many of these informed decision makers will provide oversight to the industry, determine market trends and continue to share the positive story of California agriculture. The benefits derived from this project will transcend CFAITC and the grant period.

D. Objectives

1. Provide a clear, concise and complete statement of each specific educational objective, including outreach.

Objective: Create a comprehensive, multi-lesson unit that will educate students in grades 8-12 about the relationships between fertilizers, food, plant nutrition and the environment.

CFAITC is seeking FREP funds to create and distribute *Chemistry, Fertilizer and the Environment*, a multi-lesson unit that will use chemistry concepts as an instrument of teaching fertilizer and environmental education. Each lesson will contain background information, content standards, English language learner adaptations and ideas for extension activities and lesson variations. The lessons will be activity-based, engaging students with kinesthetic laboratories and encouraging student curiosity to maximize learning. Lessons will be aligned to the Content Standards for California Public Schools and address plant nutrient requirements, water and soil quality testing and environmental stewardship. The new comprehensive unit will be available for download on CFAITC's website, *www.cfaitc.org*. In 2009, more than 132,000 copies of lesson plans were downloaded for classroom use from the site.

Objective: Update and align the already existing unit *What Do Plants Need to Grow?* for grades 2-4

FREP funds will provide the opportunity to update and align the unit, *What Do Plants Need to Grow?* This unit has been the most popular comprehensive unit for the past three years, averaging approximately 9,000 downloads each month. Although it has not been revised since 1993, the demand trend for this resource continues to increase over time. By updating the unit, teachers will have access to a current source of fact-based plant nutrient information. By aligning the unit to the CA content standards, teachers will be able to implement the resource into classroom instruction and easily justify the academic disciplines reinforced. The updated unit will be available for download on CFAITC's website, *www.cfaitc.org*.

Objective: Develop five "Grab 'n' Go" teacher training kits that will be used introduce teachers to the above-mentioned curriculum and encourage them to implement the curriculum into their classrooms.

CFAITC will use FREP funds to develop 5 "Grab 'n' Go" training kits that feature key activities and lessons from *Chemistry, Fertilizer and the Environment*. Each kit will contain materials to provide hands-on teacher training for 30 educators, demonstrating how to use the interdisciplinary unit in the classroom. The kits will be available for CFAITC Certified Presenters and Program Coordinators to feature fertilizer education at numerous workshops and conference exhibits. FREP funds are being requested to supplement the costs associated with presenting *Chemistry, Fertilizer and the Environment* teacher trainings at state and national teaching venues. In addition to being available to CFAITC Program Coordinators and Certified Presenters for use at teacher conferences and workshops, the kits will also be available to borrow on "loan" by educators and County Farm Bureaus. By training teachers, CFAITC is maximizing the grant's impact and reaching countless students with the crucial message of fertilizer use and application practices.

These three project objectives will provide a comprehensive approach to increasing student knowledge, understanding and appreciation for plant nutrients and the hard working individuals who produce the world's food and fiber. By developing and implementing these three programs, CFAITC anticipates the following responses among student populations: increased understanding of the essential role of plant nutrients in agriculture production, enhanced appreciation of the agriculture industry's efforts to improve environmental stewardship, and greater interest in plant science-related careers.

E. Work Plans and Methods

1. Work plan
This is a two-year project. The first year (Table 1) will focus on creating a new secondary (grades 8-12) curriculum titled, *Chemistry, Fertilizer and the Environment*. The second year (Table 2) will dedicate funds to print *Chemistry, Fertilizer and the Environment*, develop Grab 'n' Go kits to train teachers statewide and update *What Do Plants Need to Grow?*, an elementary (grades 2-4) unit originally developed in 1993.

Table 1. 2011 Work Plan

Project Task	Completion Date	Product, Results, Measurable Outcomes
1. Receive funds for project	January 2011	N/A
2. Plan *Chemistry, Fertilizer and the Environment* 3-day development meeting	March 2011	N/A
3. Facilitate *Chemistry, Fertilizer and the Environment* 3-day development meeting	May 2011	Rough draft of instructional unit.
4. Organize *Chemistry, Fertilizer and the Environment* and develop background information	June 2011	Complete instructional unit available for review.
5. Present *Chemistry, Fertilizer and the Environment* to industry experts for review	August 2011	Feedback for technical improvements.
6. Pilot *Chemistry, Fertilizer and the Environment* four California classrooms	September – October 2011	Feedback for curriculum improvements.
7. Align *Chemistry, Fertilizer and the Environment* to CA Content Standards for Public Schools	November 2011	Content standard matrix to be included in instructional unit.
8. Layout and design *Chemistry, Fertilizer and the Environment*	November – December 2011	Instructional unit ready for printing and various distribution methods.

Table 2. 2012 Work Plan

Project Task	Completion Date	Product, Results, Measurable Outcomes
1. Print *Chemistry, Fertilizer and the Environment* sets	January 2012	Hard copies of instructional unit available in both paper and CD format for distribution at ag days, teacher trainings and conference exhibits.
2. Add *Chemistry, Fertilizer and the Environment* to lesson plan section of www.cfaitc.org	January 2012	Instructional unit accessible worldwide. California educators strengthen students STEM skills and appreciation for agriculture while teaching State Standards. Downloads are evaluated with Web counter.
3. Plan *What Do Plants Need to Grow?* 1-day update meeting	February 2012	N/A
4. Facilitate *What Do Plants Need to Grow?* 1-day update meeting	February 2012	Rough draft of updated unit.

5. Present *What Do Plants Need to Grow?* to industry experts for review	March 2012	Feedback for technical improvements.
6. Align *What Do Plants Need to Grow?* to CA Content Standards for Public Schools	March 2012	Content standard matrix to be added to instructional unit.
7. Layout and design *What Do Plants Need to Grow?*	April – May 2012	Updated unit ready for various distribution methods.
8. Develop and assemble *Chemistry, Fertilizer and the Environment* Grab 'n' Go kits	March – May 2012	Five ready-to-use teacher training kits that highlight *Chemistry, Fertilizer and the Environment* lesson activities.
9. CFAITC staff training: *Chemistry, Fertilizer and the Environment* Grab 'n' Go kits	June 2012	CFAITC staff skilled to train educators how to successfully implement curriculum.
10. Promote new/updated resources through social media	June 2012	Increased website downloads of instructional unit.
11. Promote new/updated resources through monthly *Cream of the Crop* e-newsletter	June 2012	12,000 people receive announcement of new resource. Increased website downloads of instructional unit.
12. Present new/updated resources at national educators conference (ex: National Agriculture in the Classroom Conference)	June 2012	100 teachers receive training to implement instructional unit in the classroom. Collect contact information to administer survey in December 2012.
13. Present new/updated resources at state educators conference (ex: California Science Teachers Conference)	October 2012	100 teachers receive training to implement instructional unit in the classroom. Collect contact information to administer survey in December 2012.
14. Project evaluation	December 2012	Electronic survey administered to teachers. Compile teacher observations, assessments and specific student insights, recognitions, and understandings about agriculture after implementing the curriculum.
15. Compile the results of project for final report	January 2013	Project complete and final report submitted.
16. Project promotion and dissemination	Ongoing	N/A

2. Methods

The proposed project offers a comprehensive, three-pronged approach to increasing student understanding of the essential role of plant nutrients in agriculture production, enhancing student appreciation of the agriculture industry's efforts to improve environmental stewardship and encouraging students to pursue a career in plant sciences.

Part 1: New unit development – *Chemistry, Fertilizer and the Environment*

Production of new educational resources is coordinated by California Foundation for Agriculture in the Classroom's curriculum coordinator. The curriculum coordinator reports to Judy Culbertson, executive director of the California Foundation for Agriculture in the Classroom. The curriculum coordinator invites selected educators from CFAITC's network of 12,000 contacts to serve on a writing committee for the development of a new comprehensive unit, *Chemistry, Fertilizer and the Environment*. Industry or educational experts from partnering organizations, such as the California Fertilizer Foundation and the California Department of Education, are also invited to serve on the writing committee. The selected

group reviews and discusses the topics to be addressed within the unit, investigates the facts, collaborates with other agriculture industry professionals, and develops a rough draft of lesson plans. Following the development meeting, the curriculum coordinator organizes and polishes the language of the instructional unit, adding an introduction, unit overview, acknowledgements, glossary, commonly asked questions, additional teacher resources and references, related websites, and related literature. The draft copy of the resource is then submitted to industry experts for technical review. Feedback for technical improvements is received and changes are implemented. Often, several rounds of reviews will occur to attain absolute accuracy. Pilot lessons will be executed in several California classrooms. The educators conducting the lessons will provide specific feedback for curricular improvements. Once again, teacher suggestions are considered and often implemented within the instructional unit. Following the review process, the curriculum coordinator aligns the lessons to the California State Board of Education's Content Standards. Once the copy has been finalized, the unit is formatted and illustrated to CFAITC formatting guidelines by a graphic designer.

Part 2: Unit update – *What Do Plants Need to Grow?*
CFAITC's curriculum coordinator will plan and facilitate a one-day curriculum update workshop held at the CFAITC office in Sacramento to be attended by two educators. Participating educators will be selected based on their experience working with CFAITC and experience teaching life science. The goal of the update meeting is to align the resource to the CA content standards, create additional hands-on activities, and make necessary updates. The curriculum coordinator will use ideas developed at this meeting to make necessary changes and updates to the current curriculum. Following the meeting, the curriculum coordinator will format the lesson and create the pre- and post-tests to be used in the classroom. Feedback will be assessed from industry reviews and proof editing. Changes will be made to create the most accurate, relevant and useable curriculum possible.

Part 3: Grab 'n' Go training kits – *Chemistry, Fertilizer and the Environment*
Materials needed for the select lesson activities, as well as supplemental materials, will be purchased and assembled into two "Grab 'n' Go" Kits. These kits will be a creative and non-traditional way to provide hands-on training to teachers throughout the state. By showing teachers how easy it is to implement plant nutrient and environmental education into their classroom, they will be better equipped to meet the imperative need for fertilizer education.

The kits and teacher-training curriculum will be designed with the following overarching goals: 1) Increase student understanding of the essential role of plant nutrients in agriculture production; 2) Enhance student appreciation of the agriculture industry's efforts to improve environmental stewardship; 3) Encourage students to pursue a career in plant sciences; 4) Meet the Content Standards for California Public Schools; and 5) Provide a non-traditional resource which can serve as a model for AITC programs nationwide. In addition to being available to CFAITC Program Coordinators and Certified Presenters for use at teacher conferences and workshops, the kits will also be available to borrow on "loan" by educators and County Farm Bureaus. By training teachers, CFAITC is maximizing the grant's impact and reaching countless students with the crucial message of fertilizer use and application practices.

Project dissemination
Project dissemination plans to the academic community are clearly outlined in Table 1 and 2. Developed curriculum will be available to educators in three formats: hard copy (print), electronic copy (CD) and electronic (online). CFAITC will distribute hard copies and CDs of the instructional resource at the California State Fair, Farm Days, California and National AITC Conferences, student teacher presentations and teacher conferences. We will also ship the resource to California teachers by request. To disseminate the project to the broadest extent among the academic community, CFAITC is committed to promoting the new resource via social media and our e-newsletter, *Cream of the Crop*. CFAITC has access to over 1,300 "fans" and "followers" via social media, who regularly receive updates from our organization. The California Foundation for Agriculture in the Classroom also communicates regularly with a growing number of key educators, whom we identify as our "Ambassadors." Our Ambassadors currently total 12,000 educators. Another 9,000 individuals are on CFAITC's mailing list as Friends of Agriculture. These Friends of Agriculture are non-teachers with an interest in agricultural education, perhaps serving

as volunteers in their communities and promoting and using Agriculture in the Classroom resources through programs such as California Women for Agriculture (CWA), the Water Education Foundation, county Farm Bureau agriculture education programs, California Regional Environmental Education Community (CREEC), or school garden programs. *Cream of the Crop,* CFAITC's electronic newsletter sent to CFAITC Ambassadors and Friends of Agriculture will announce availability of this new resource and how to easily access it.

In addition, this project will be listed in CFAITC's 2013 Teacher Resource Guide (*www.cfaitc.org/trg*) and the USDA-AITC National Resource Directory (*www.agclassroom.org/directory*). The project outcomes/impacts will be shared with other AITC contacts at regional and national meetings. Electronic communication will announce the resource's availability to the greater agriculture community.

3. Experimental site

This project will be pilot tested in four California classrooms, to be determined during the project period. Typically, CFAITC works with school district curriculum specialists to select the appropriate classrooms. In addition, this resource will reach thousands of classrooms and hundreds of school districts during the life of the project.

F. Project Management, Evaluation and Outreach

1. Management
Mandi Bottoms, curriculum coordinator for California Foundation for Agriculture in the Classroom will develop, organize, and lead the daily actions of this project. Mandi joined CFAITC in August 2008. Mandi earned a Bachelor of Science degree in Agriculture Science, a Single-Subject Teaching Credential in Agriculture, and a Master of Science degree in Agriculture from Cal Poly San Luis Obispo. Mandi reports to Judy Culbertson, executive director, California Foundation for Agriculture in the Classroom. Judy is past president of the National Agriculture in the Classroom Consortium. Judy earned a Bachelor of Science degree in Agricultural Business Management from Cal Poly, San Luis Obispo. Judy will oversee this project and has overseen all projects of the California Foundation for Agriculture in the Classroom since 1997. Judy and Mandi will share the responsibilities for assessing project results and administering the project evaluation and reporting process. Renee Hyatt, website and social media coordinator for California Foundation for Agriculture in the Classroom, will provide technology support for this project. Renee holds a Bachelor of Arts degree in Art Studio and has completed the Webmaster Certificate Program from California State University, Sacramento. She has worked for CFAITC for 10 years. Technology support includes promoting through social media, maintaining the instructional unit on CFAITC's website, quantifying and providing reports for monthly curriculum downloads, and resource printing and duplication. Renee will also be responsible for graphic design oversight.

Project cooperators, Pamela Emery (California Fertilizer Foundation) and Dave Menshew (James C. Enochs High School) will serve on the curriculum development writing team. Both cooperators have extensive backgrounds in education, science and the agriculture industry. See the attached letters of support for more details about project cooperation.

2. Evaluation
Several different methods will be used to accurately and completely evaluate the success of the proposed project. CFAITC will use both qualitative and quantitative methods to determine if project objectives were obtained.

The first approach will provide a means to improve the curriculum during the development process. The new unit will be pilot tested in four secondary classrooms and teachers will be required to complete a standardized evaluation addressing both the content of the unit as well as the teaching methods suggested. These evaluations will be used directly for ongoing project improvement. Students participating in the pilot testing procedure will also complete an assessment. CFAITC will create a pre- and post-test to measure changes in student knowledge (specific content matter) and appreciation for agriculture (overarching message). Through this evaluation method, we will be able to quantify student learning and determine the effectiveness of this project.

The second approach is strictly quantitative. CFAITC will monitor the number of times *Chemistry, Fertilizer and the Environment* and *What Do Plants Need to Grow?* are downloaded from www.cfaitc.org. Although this evaluation method does not directly reflect the number of teachers teaching the entire unit, it can provide insight to teacher interest in the subject and the quantity of teachers who extract information or specific lessons from the resource.

The third approach reaches all CFAITC Ambassadors and Friends. Upon completion of the project, CFAITC will evaluate by means of an established annual survey. The online survey is distributed to approximately 6,000 individuals and will be used to measure the project's stated objectives to: 1) Increase student understanding of the essential role of plant nutrients in agriculture production; 2) Enhance student appreciation of the agriculture industry's efforts to improve environmental stewardship and 3) Encourage students to pursue a career in plant sciences. Educators will access the survey online and be asked to evaluate many of CFAITC's programs, including the fertilizer curriculum.

3. Outreach
In order to increase educator awareness of the project's completion and availability, CFAITC is requesting FREP funds to present the finished curriculum and Grab 'n' Go kits at a state and national teacher training. These trainings are significant, because attending educators will receive hands-on training to incorporate the resource into their classroom immediately. After experiencing the unit through a teacher training, educators will be motivated to promote the resource to their colleagues by word-of-mouth.

State educator conferences may include:

- California Agriculture in the Classroom Conference
- California Agriculture Teachers Association Conference
- California Science Education Conference

National educator conferences may include:

- ChemEd Teachers Conference
- Chemical Education Conference
- Metropolitan Association for Teachers of Science
- National Ag Science Center Workshops
- National Agriculture in the Classroom Conference
- National Science Teachers Conferences

The resources will also be presented at the annual California Agriculture Literacy Coalition meeting. The Agriculture Literacy Coalition is a cohesive group of individuals who represent more than 100 different agriculture literacy organizations and agriculture companies who share a similar mission of increasing the public agricultural knowledge and appreciation for the industry. This promotion is an essential component of this project because it alerts educators and friends of agriculture about the availability of this curriculum, which ought to increase the number of individuals accessing it online and requesting hard copies.