NEPA Decision Summary for Permit #08-205-101r

The National Environmental Policy Act of 1969 (NEPA) is the mandate of any federal agency or department for the protection of the environment. NEPA requires all federal agencies to consider the values of environmental preservation for all significant actions and prescribes procedural measures to ensure that those values are in fact fully respected.

The Council on Environmental Quality (CEQ) developed the categorical exclusion process to reduce the amount of unnecessary paperwork and delay associated with NEPA compliance.

The categorically excluded actions for APHIS Biotechnology Regulatory Service (BRS) processes are listed in 7 CFR 372.5(c)(2)(ii):

> "Permitting, or acknowledgment of notifications for, confined field releases of genetically engineered organisms and products"

However, the CEQ acknowledged that, from time to time, exceptions to a categorical exclusion may arise. As a result, the CEQ requires all agencies to develop procedures to determine whether a normally excluded action may have a significant environmental effect. Exceptions to categorically excluded actions for APHIS BRS are determined by the following criteria found in 7 CFR 372.5(d)(4):

> "When a confined field release of genetically engineered organisms or products involves new species or organisms or novel modifications that raise new issues."

SemBioSys has requested a permit to plant up to 100 acres of genetically engineered safflower within 3 sites in Grant, Douglas and Lincoln Counties. Safflower plants were engineered so a modified human Apo-A1M gene was fused to an *Arabidopsis* oleosin single chain antibody to be exclusively expressed in the seeds. The GE safflower also contains a selectable marker the company has deemed CBI. Expression of this gene is controlled by the phaseolin promoter and terminator sequences from *Phaseolus vulgaris* L. (common bean). The phaseolin promoter drives the exclusively seed-specific transcription of human Apo-A1M.

APHIS BRS has reviewed the permit application and has set permit conditions for the activities to be authorized under this permit. These conditions can be found in the e-permits file associated with this application. APHIS BRS has concluded that issuing Permit number 08-205-101r is categorically excluded action under section 7 CFR 372.5(c)(ii) because it is a confined field release of genetically engineered organisms.

The field release is confined for the following reasons:

1) The proposed field release site is for up to 100 acres, in 3 locations. There will be 1 planting per location. The small experimental plots with limited plant numbers decrease the pollination potential (pollen pool) of the field site to other plants not involved in the study. Studies have suggested large

field sites and therefore, large pollen pools increase the potential for pollination and gene escape.[1]

2) Experimental plots will be conducted in Grant, Lincoln and Douglas Counties. There will be no other GE plants within 2 miles of the experimental plots and sexually compatible wild relatives do not exist in the area. The closest commercial safflower field is over 10 miles away and the safflower is morphologically distinct from what is being grown. No organic safflower is grown in these counties. This prevents escape of the genetic traits via pollination.
3) Dormancy is reported to be very short. Short dormancy ensures that rogue volunteer plants will not appear after the experiment has terminated and the volunteer monitoring period has ended.
4) Safflower seed will be imported to the field sites and stored in locked, labeled facilities.
5) Waste or plant material generated by sample processing or handling will be destroyed by tilling or herbicide application. Destruction prevents inadvertent plant material escape.
6) The regulated area will be monitored monthly for a year after termination of the trial. If regrowth is found, it will be destroyed immediately. Should regrowth be found during the last monitoring month (month 12) of the year, monitoring will continue and APHIS BRS Compliance will be notified.

APHIS has determined that the exception for categorically excluded actions (7 CFR 372.5(d)(4)) Do not apply to this action for the following reasons:

1) This GE safflower is not a new species to APHIS. APHIS has processed 16 safflower notifications and permits to date since 2003. Two Environmental Assessments (EAs) on safflower have been written by APHIS covering the confinement, plant pest and NEPA issues of safflower in Washington State in all counties (Grant, Lincoln and Douglas) where the safflower in this permit is to be planted (EAs are associated with permit numbers 06-250-02r, 06-363-103r and 07-021-101r). In the prior EAs on safflower, APHIS considered 10 acres, 250 acres and 1000 acres of safflower to be planted and determined that the confinement conditions were adequate for all of those size field trials. APHIS and the permit applicant are familiar with safflower biology, confinement and agricultural practices.
2) The introduced traits do not raise new issues. Apolipoprotein is a common protein found in all mammals and is consumed by humans and vertebrates. Thus in the unlikely event of transgenic safflower consumption by vertebrate or invertebrate animals, no significant negative effect should occur.
3) APHIS BRS has issued prior permits for GE safflower with proinsulin, carp growth hormone and rennin and have found no significant impacts to the human environment. All proteins produced by the construct in this permit were analyzed for sequence homology to known toxins. No known toxins were identified.

[1] USDA APHIS (2004). Workshop on the Confinement of Genetically Engineered Crops during Field Testing, September 13-15, 2004. Washington, D.C.

SemBioSys, Inc has engineered safflower to contain the human Apo-A1M gene fused with an oleosin single chain antibody to *Arabidopsis*. The recipient organism, *Carthamus tinctorius*, cv. S-317, is a common commercial cultivar and is grown mainly for its seed, which is used for its oil in both food and industrial processing. The resulting transgenic safflower seed will be used to develop isolation techniques for human Apo-A1M for future clinical trials.

Cholesterol is an essential constituent of animal cell membranes and serves as a precursor for bile acids, required for the emulsification of fats in the diet and steroid hormones. The delivery of cholesterol and fats from the intestine and liver through the blood stream and lymph is carried out by lipoproteins. Low Density Lipoproteins (LDL) circulates in the blood and plaque is formed when excess lipoprotein slowly builds up on the inner walls of the arteries that feed the heart and brain. High Density Lipoproteins (HDL) are often called "good" cholesterol because they seem to protect against heart disease (Grundy 1996) and plaque build up.

Apolipoprotein A1 (Apo-A1) is the major protein constituent of HDL (70%) and is relatively abundant in the plasma (Schonfeld, Patsch et al. 1982). The implication that Apo-A1 plays an important role in the prevention of coronary heart disease is supported by findings that infusion of HDL particles, Apo-A1 liposomes, or over-expression of the human Apo-A1 gene inhibits the disease process in animal models of atherosclerosis (Badimon, Badimon et al. 1990; Rubin, Krauss et al. 1991; Liu, Lawn et al. 1994; Paszty, Maeda et al. 1994; Miyazak, Sakuma et al. 1995; Shah, Nilsson et al. 1998). Based on these and other findings, there has been a concerted effort to produce large amounts of purified Apo-A1, which could form the basis of novel therapies targeting atherosclerotic cardiovascular disease.

Aside from the potential therapeutic applications of native Apo-A1, there is a naturally occurring genetic variant of human Apo-A1, apolipoprotein A1Milano (Apo-A1M), which may have even greater therapeutic potential. First characterized in an Italian family exhibiting hypertriglyceridemia and very marked decreases in HDL-cholesterol levels, carriers of Apo-A1M exhibit very few signs of atherosclerosis or atherosclerotic disease even though HDL cholesterol levels are low (Franceschini, Sirtori et al. 1980; Weisgraber, Bersot et al. 1980).

In addition to determining that the field trial is confined and that the exclusions do not apply to this action, APHIS has also concluded that there are unlikely to be any significant impacts from the authorization of this field trial because:

1) The field release is limited in time and space. The plants will be in the field for less than one year in an area equal to or less than 100 acres
2) The genes do not code for toxins or any other substance that is likely to harm any animals or humans that may encounter the plants.
3) The GE plants do not encode any substances that will persist in the soil, water or air. Most of the genes alter the expression levels of naturally occurring compounds. The marker gene codes for a protein that will degrade in the environment like other proteins native to the plant.
4) The genetically engineered safflower will not be used for food or feed.

APHIS analyzed the potential for effects to federally-listed threatened or endangered species and their critical habitat. Based on the analysis below APHIS has determined that there is no *effect* to any of these species or that the activities authorized in this permit would result in the alteration of any designated critical habitat.

Threatened and Endangered species listed for Washington State include 9 threatened or endangered plant species and 34 animal species. Of the 34 listed, only four animals potentially reside in Douglas, Grant and Lincoln Counties, WA (http://ecos.fws.gov/tess_public/StateListingAndOccurrence.do?state=WA; accessed on January 2010); bald eagle (*Haliaeetus leucocephalus*), pygmy rabbit, *Brachylagus idahoenis*), white-tailed deer (*Odocoileus virginianus leucurus*) and gray wolf (*Canis lupus*). None of these animals are traditionally found in or around safflower or use safflower as a primary food source.

Of the nine plants listed, only one threatened species potentially resides in Lincoln County and another threatened species in Douglas County (http://ecos.fws.gov/); Spalding's Catchfly (*Silene spaldingii*) in Lincoln County and ladies' tresses (*Spiranthes diluvialis*) in Douglas County. Of those terrestrial species none reside in agricultural fields. APHIS has reached a determination that the release of transgenic safflower (08-205-101r) would have no effect on federally listed threatened or endangered species or species proposed for listing, nor is it expected to adversely modify designated critical habitat or habitat proposed for designation, compared to current agricultural practices.

This GE safflower field trial will occur on land that has been cultivated for agricultural purposes since for over 10 years and therefore will not eliminate habitat that may contain a threatened, endangered or candidate species.

The experimental plot will also not affect any TES species listed for Grant, Douglas or Lincoln Counties as safflower is not a primary food or habitat for any TES species in these three counties.

Signed: _____/s/_____
John M. Cordts, M.S.
Chief, Plant Pests and Protectants Branch
Environmental Risk Analysis Division
Biotechnology Regulatory Services

Date: _____1/29/10_____

References

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Animals -- 34 listings

Status	Species/Listing Name
E	Albatross, short-tailed (***Phoebastria (=Diomedea) albatrus***)
T	Bear, grizzly lower 48 States, except where listed as an experimental population or delisted (***Ursus arctos horribilis***)
T	Butterfly, Oregon silverspot (***Speyeria zerene hippolyta***)
E	Caribou, woodland Selkirk Mountain population (***Rangifer tarandus caribou***)
E	Deer, Columbian white-tailed Columbia River DPS (***Odocoileus virginianus leucurus***)
T	Lynx, Canada (Contiguous U.S. DPS) (***Lynx canadensis***)
T	Murrelet, marbled CA, OR, WA (***Brachyramphus marmoratus***)
T	Owl, northern spotted (***Strix occidentalis caurina***)
T	Plover, western snowy Pacific coastal pop. (***Charadrius alexandrinus nivosus***)
E	Rabbit, pygmy Columbia Basin DPS (***Brachylagus idahoensis***)
T	Salmon, chinook Puget Sound (***Oncorhynchus (=Salmo) tshawytscha***)
T	Salmon, chinook fall Snake R. (***Oncorhynchus (=Salmo) tshawytscha***)
T	Salmon, chinook lower Columbia R. (***Oncorhynchus (=Salmo) tshawytscha***)
E	Salmon, chinook spring upper Columbia R. (***Oncorhynchus (=Salmo) tshawytscha***)
T	Salmon, chinook spring/summer Snake R. (***Oncorhynchus (=Salmo) tshawytscha***)
T	Salmon, chum Columbia R. (***Oncorhynchus (=Salmo) keta***)
T	Salmon, chum summer-run Hood Canal (***Oncorhynchus (=Salmo) keta***)
T	Salmon, sockeye U.S.A. (Ozette Lake, WA) (***Oncorhynchus (=Salmo) nerka***)
E	Salmon, sockeye U.S.A. (Snake River, ID stock wherever found.) (***Oncorhynchus (=Salmo) nerka***)
T	Sea turtle green except where endangered (***Chelonia mydas***)

Plants -- 9 listings

Status	Species/Listing Name
T	Catchfly, Spalding's (***Silene spaldingii***)
T	Checker-mallow, Nelson's (***Sidalcea nelsoniana***)
E	Checkermallow, Wenatchee Mountains (***Sidalcea oregana var. calva***)
E	Desert-parsley, Bradshaw's (***Lomatium bradshawii***)
T	Howellia, water (***Howellia aquatilis***)
T	Ladies'-tresses, Ute (***Spiranthes diluvialis***)
T	Lupine, Kincaid's (***Lupinus sulphureus (=oreganus) ssp. kincaidii (=var. kincaidii)***)
T	Paintbrush, golden (***Castilleja levisecta***)
E	Stickseed, showy (***Hackelia venusta***)

Last updated: January 25, 2010