NEW PEST ADVISORY GROUP (NPAG)
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NPAG Report

Scirtothrips dorsalis Hood: Chilli Thrips

Thysanoptera/Thripidae

NPAG Chair Approval Date: March 3, 2006

Initiating Event, Notifier and Affiliation, Notification Date, and First Reported Date: On 10/19/05 *Scirtothrips dorsalis* was positively identified by SEL from specimens submitted from Palm Beach County. As of 11/30/05 S*cirtothrips dorsalis* has been collected in Florida 77 times in 16 counties (Clark 2005). Subsequently to the October detection, on 11/16/05 additional specimens were identified from Texas. Surveys in Texas have resulted in positive detections in 3 counties on *Capsicum* sp. on 11/10/05 and 11/14/05 (Carlson 2005). Recently in early 2006, S*cirtothrips dorsalis* was confirmed from samples collected in Jardin La Ceiba, Puerto Rico (Gabriel 2006). On 2/15/06 NPAG was requested to assess *Scirtothrips dorsalis.*

Data sheet(s): CABI 2005 (Last Modified 2/98); Schall 1995; EPPO/CABI 1998

Current PPQ Policy: *Scirtothrips dorsalis* is currently listed as reportable/actionable in the PIN309 Database (Query 2/16/06), and has been intercepted 51 times at ports of entry. *Scirtothrips dorsalis* is not listed on the Aphis Regulated Plant Pest List (Query 2/16/06).

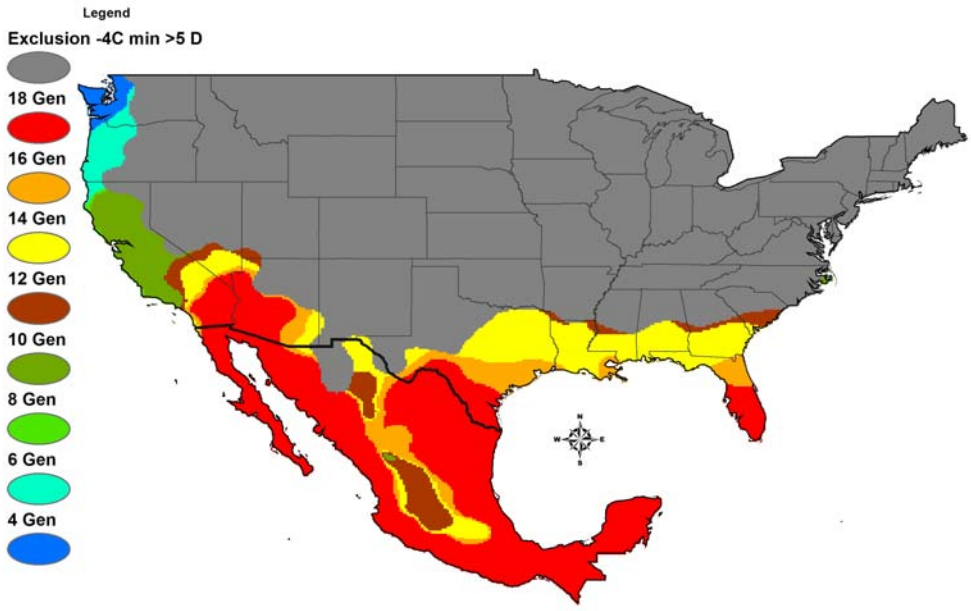
Pest Situation Overview:

Exotic Status: New to the U.S. *Scirtothrips dorsalis* was collected in Florida and Texas in late 2005, and in Puerto Rico in early 2006. Two previous detections occurred in FL in 1991 and 1994, with no additional detections reported between 1994 and 2005.

Biology: The occurrence of *Scirtothrips dorsalis* typically coincides with the flowering of host plants, although *Scirtothrips dorsalis* feeds on shoots, leaves, and young fruit in addition to flowers (GPDD 2006). While *Scirtothrips dorsalis* is capable of producing continual generations per year, *Scirtothrips dorsalis* typically undergo 4-8 generations per year (Venette and Davis 2004). The number, frequency, and duration of generation times are dependant on temperature and moisture. Life cycles are the slowest at the upper and lower temperature extremes (Schall 1995), and *Scirtothrips dorsalis* is capable of over wintering in the soil or protected in plant parts in the adult stage (Venette and Davis 2004).

A degree day (DD) model was developed by CPHST (2005) to determine the potential number of generation

per year the U.S. climate could support, as well as pinpoint the areas that could climatically support establishment. The model was based on a DD requirement of 281 days per generation; in addition the model excluded regions where the minimum temperature reached -4°C or below for five consecutive days. The results showed that parts of FL, TX, AZ, CA, and NV could sustain up to 18 generations per year, and that several states are susceptible to establishment (USDA-APHIS-PPQ-CPHST 2005).



Generational potential (based on a generational requirement of 281 DD and a base and upper development temperature of 9.7°C and 33.0°C, respectively) outside of the predicted cold temperature exclusion boundary (areas where the minimum daily temperature reaches -4°C or below on 5 or more days per year) for *S. dorsalis* in the U.S. and Mexico. (USDA-APHIS-PPQ-CPHST 2005)

Scirtothrips dorsalis is capable of reproducing both sexually and parthenogenically (Pest Alert 2005). Adults typically mate 2-3 days after their pupal molt and the females oviposit 3-5 days after emergence. Females tend to lay eggs continuously with the total number of eggs ranging from 40-68 (Venette and Davis 2004; GPDD 2006). Larvae and adults feed on shoots, leaves, young fruit, and flowers of the host plant, causing damage and spreading disease. Types of damage include browning or blackening of infested plant parts, that may also create stains and scars (Venette and Davis 2004; CABI 2005; Pest Alert 2005). Severe infestations may lead to deformation and defoliation. The axillary leaf branches tend to sustain the most damage (CABI 2005). *Scirtothrips dorsalis* has been known to transmit several plant diseases including Tomato Spotted Wilt Virus which causes Bud Necrosis Disease in peanuts, Yellow Spot Virus on groundnut, non viral Chilli Leaf Curl disease (Schall 1995), Peanut Chlorotic Fan Virus, and Peanut Yellow Spot Virus (USDA-APHIS-PPQ-CPHST 2005).

Prevalence and global distribution: *Scirtothrips dorsalis* has been reported in Asia, Africa, North America, Eastern Europe, and Oceania. More specifically *Scirtothrips dorsalis* has been detected in the countries of Bangladesh, Brunei Darussalam, China, Hong Kong, India, Indonesia, Israel, Japan, Republic of Korea, Malaysia, Myanmar, Pakistan, Philippines, Sri Lanka, Taiwan, Thailand, Côte d'Ivoire, South Africa, USA

(Hawaii), Australia, Papua New Guinea, and Solomon Islands (CABI/EPPO 1998; Venette and Davis 2004; CABI 2005) Since 2003 *Scirtothrips dorsalis* has been reported from the Caribbean region, Central and North America in the countries of St. Vincent, the Grenadines, Barbados, St. Lucia, Trinidad and Tobago, Suriname and Venezuela (USDA-APHIS-PPQ 2005, USDA-APHIS-PPQ OPIS, 2005). Most recently *Scirtothrips dorsalis* has been detected in Florida and Texas in late 2005 and in Puerto Rico in early 2006.

Host Range: **Actinidiaceae:** *Actinidia deliciosa* [=*A. chinensis*] (kiwi fruit), **Amaranthaceae:** *Alternanthera sessilis (L.)* (joyweed), *Amaranthus* spp., **Anacardiaceae:** *Anacardium occidentale* (cashew nut), *Mangifera indica* (mango), **Asparagaceae:** *Asparagus officinalis* (asparagus), **Asteraceae:** *Dahlia pinnata* (dahlia), *Dimorphotheca aurantiaca* (African daisy), *Helianthus annuus* (sunflower), **Caprifoliaceae:** *Viburnum awabuki* (sweet viburnum), **Chenopodiaceae:** *Beta vulgaris* (garden beet), **Convolvulaceae:** *Ipomoea batatas* (sweet potato), **Cucurbitaceae:** *Citrullus lanatus* (watermelon), *Cucumis melo* (cantaloupe), *Cucumis sativus* (cucumber), *Cucurbita pepo* (pumpkin/zucchini), **Ebenaceae:** *Diospyros kaki* (persimmon), **Euphorbiaceae:** *Hevea brasiliensis* (rubber trees), *Ricinus communis* (castor bean), **Fabaceae:** *Acacia auriculiformis* (northern black wattle), *Acacia brownie*, *Arachis hypogaea* (peanut), *Arachis* spp., *Brownea* spp., *Dolichos lablab* (hyacinth bean), *Glycine max* (soybean), *Melilotus indica* (sourclover), *Mimosa pudica*, *Mimosa* spp., *Phaseolus vulgaris* (green bean), *Saraca minor*, *Saraca* spp., *Tamarindus indica* (tamarind), *Vigna radiate* (mung bean), **Hydrangeaceae:** *Hydrangea* spp., **Liliaceae:** *Allium cepa* (onion), *Allium sativum* (garlic), **Lythraceae:** *Cuphea hyssopifolia* (false heather), **Malvaceae:** *Gossypium hirsutum* (cotton), *Abelmoschus esculentus* (okra), **Moraceae:** *Morus* sp. (mulberry), **Myrtaceae:** *Syzygium samarangense* (water berry), **Nelumbonaceae:** *Nelumbo lutea* (lotus), *Nelumbo nucifera*, *Nelumbo* spp. (lotus), **Passifloraceae:** *Passiflora edulis* (passion fruit), **Poaceae:** *Zea mays* (corn), **Polygonaceae:** *Fagopyrum esculentum* (buckwheat), **Portulacaceae:** *Portulaca oleracea* (purslane), **Punicaceae:** *Punica granatum* (pomegranate), **Rhamnaceae:** *Zizyphus mauritiana* (Indian jujube), **Rosaceae:** *Fragaria* spp. (strawberries), *Fragaria chiloensis* (strawberry), *Prunus persica* [=*Amygadalus persica* L.] (peach), *Pyrus* spp. (pear), *Rosa* spp. (rose), *Rubus* spp. (raspberry), **Rutaceae:** *Citrus aurantiifolia* (lime), *Citrus sinensis* (navel orange), *Citrus* spp., **Salicaceae:** *Populus deltoids* (poplar), **Sapindaceae:** *Dimocarpus longan* (longan tree), *Litchi chinensis* (litchi), *Nephelium lappaceum* (rambutan), **Solanaceae:** *Capsicum* spp., *Capsicum annuum* (pepper), *Capsicum frutescens* (chilli), *Lycopersicon esculentum* (tomato), *Nicotiana tabacum* (tobacco), *Solanum melongena* (eggplant), *Solanum nigrum* (black nightshade), *Solanum* spp., **Theaceae:** *Camellia sinensis* (tea), **Vitaceae:** *Vitis pteroclada* (grape), *Vitis vinifera* (grape) (USDA-APHIS-PPQ-CPHST 2005).

Potential pathways and spread: *Scirtothrips dorsalis* may be entering the U.S. through infested commodity shipments. On 7/23/03 Tom Skarlinsky (USDA-APHIS-PPQ) discovered live larvae and pupae under the calyx of treated peppers destined for the U.S. exported from St. Vincent (Brodel 2003). *Scirtothrips dorsalis* has been detected at the port of entry 51 times (the genus *Scirtothrips* has been detected 125 times). *Scirtothrips dorsalis* has been discovered on the leaves , fruit, and flowers of 30 different plant species (PIN309 2006). *Scirtothrips dorsalis* is difficult to detect without the aid of stereoscopes, therefore *Scirtothrips dorsalis* infested commodities may go undetected in commercial fruit and vegetable shipments as well as flowers and propagative materials from infested regions.

According to a pathway analysis preformed by CPHST in 2005 there are several additional pathways in which *Scirtothrips dorsalis* may enter the U.S. from the Caribbean. Susceptible pathways were identified as: air passengers and crew and their baggage, mail, mail from express mail carriers, cargo, infested smuggled material, and airborne dispersal (USDA-APHIS-PPQ-CPHST 2005).

Once *Scirtothrips dorsalis* enters the U.S. it would likely encounter a plethora of suitable hosts due to its polyphagous behavior and large host range. Virtually all of the plant families *Scirtothrips dorsalis* utilizes as a

host occur in the U.S. (USDA-APHIS-PPQ-CPHST 2005). During adult population peaks, available hosts may become overwhelmed leading to adult *Scirtothrips dorsalis* utilization of non-hosts even though those hosts may not be suitable for larval feeding (Venette and Davis 2004)

Potential economic and environmental impact, and trade implications: Due to *Scirtothrips dorsalis* polyphagous behavior and very large host range, S*cirtothrips dorsalis* has the potential to cause significant economic damage if it were to establish in the U.S. S*cirtothrips dorsalis* has been reported as a serious pest of a diverse variety of commodities in several countries. S*cirtothrips dorsalis* has been reported as a serious pest on cotton in Ivory Coast, India, and Pakistan, citrus in Japan and Taiwan, peanuts in India, peppers and chilies in India, mangos in Taiwan, litchis in China, roses in India and Taiwan, *Hevea brasiliensis* in Malaysia, lotus in Taiwan, (USDA-APHIS-PPQ-CPHST 2005), strawberries in Queensland and Australia, tea in Taiwan, soybeans in Indonesia, (Pest Alert 2005), capsicum and groundnuts in India, grapevine (although S*cirtothrips dorsalis* may not breed on grapevines) and tea in Japan, (GPDD 2006), and chilli peppers in Sri Lanka (Schall 1995). S*cirtothrips dorsalis* has also been reported to cause damage in onions, tomatoes, tamarind, cashews, and castor beans (Pest Alert 2005). The majority of the above listed commodities occur in the U.S. and in fact 34 major commodity hosts exist in areas climatically suitable for establishment (USDA-APHIS-PPQ-CPHST 2005).

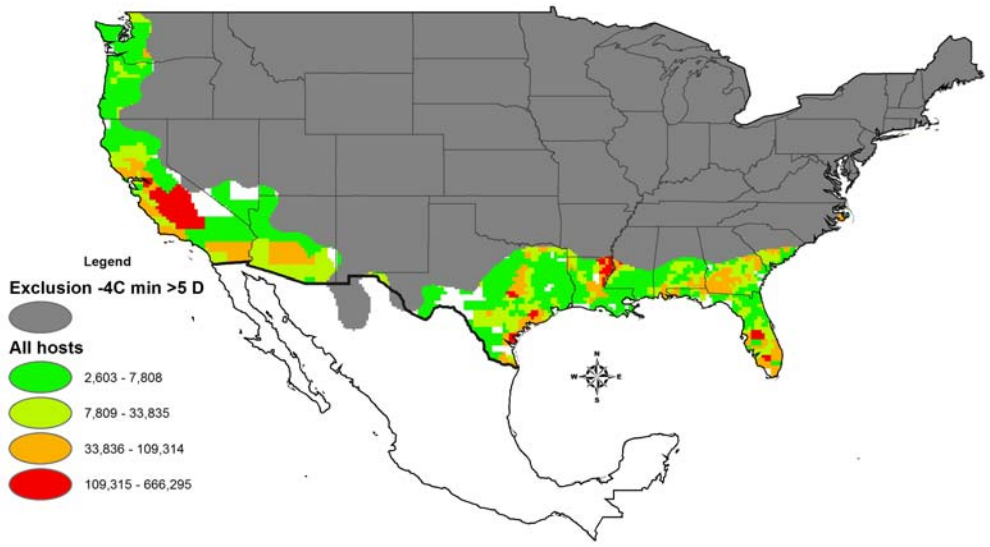


Figure 1. Acreage of 34 *S. dorsalis* hosts grown per county in 2002 (overlaid with a cold temperature exclusion boundary where the minimum daily temperature reaches -4°C or below on 5 or more days per year). Hosts included: peppers, eggplant, tomatoes, soybean, peanuts, citrus, cotton, grapes, asparagus, dry onions, green onions, lima beans, passion fruit, peaches, buckwheat, persimmon, strawberries, sweet potatoes, mangos, tobacco, snap beans, pears, prunes, potatoes, sweet corn, grain corn, raspberries, figs, cucumbers, cantaloupes, pumpkins, squash, watermelons, and plums. (USDA-APHIS-PPQ-CPHST 2005)

While the exact damage to these hosts is difficult to predict, due to the total economic value of several susceptible hosts, S*cirtothrips dorsalis* infestations could result in billions of dollars in damage to U.S. agriculture. A preliminary economic analysis performed in 2004 assessed the potential economic damage to 28 host of S*cirtothrips dorsalis*. According to the analysis if S*cirtothripsfs dorsalis* caused only 5% crop loss to these crops it would result in $3 billion dollars in losses. If crop loss were to reach 10% , then the total economic loss could reach close to $6 billion dollars (Garrett 2004). These figures were determined before the

USAD-APHIS-PPQ-CPHST (2005) distribution map was generated; therefore the analysis should be re-examined based on the 2005 map.

S*cirtothrips dorsalis* is listed by the EPPO as an A1 pest (OEPP/EPPO 2005). The establishment S*cirtothrips dorsalis* could therefore result in the loss of foreign markets.

NPAG teleconference(s): none held

Current response and activities, and technology and knowledge gaps and needs: Populations of S*cirtothrips dorsalis* have been controlled using insecticides (Schall 1995; CABI/EPPO 1998; CABI 2005; GPDD 2006). Insecticide resistance has been observed in several instances (CABI/EPPO 1998; GPDD 2006). In addition to insecticides several natural predators exist, and may be candidates for future biological control programs. These predators include anthocorid and mirid bugs, syrphids, some gall midges, lacewing larvae, spiders, sphecid wasps, and pseudoscorpions, as well as several species of fungi (Schall 1995). Resistance to S*cirtothrips dorsalis* feeding appears to exist in some plant cultivars. In chillies the presence of gallic acid appears to play a large role in resistance to S*cirtothrips dorsalis* (CABI 2005).

Since the initial detection in Florida in October 2005 the FDACS and the University of Florida have been surveying for S*cirtothrips dorsalis.* As of 11/30/05 S*cirtothrips dorsalis* has been collected in FL 77 times in 16 counties. Of the 77 detections 66 were made on roses, 10 on *Capsicum*, and 1 on Illicium (Clark 2005). It is unknown at this time how wide spread S*cirtothrips dorsalis* is in the natural environment. Only two of the 77 detections occurred in the natural environment (Ciomperlik per. communication). Following a positive detection the State of Florida is taking regulatory action eliminating infested plant material or applying insecticide treatments (Floyd 2006). In Texas the initial infested plants were traced back by SITC to Alabama and Florida. The infested material from Alabama was also traced back to two growing areas in Florida (Bryant 2005). Surveys in Texas have resulted in positive detections in 3 counties on *Capsicum* sp. on 11/10/05 and 11/14/05 (Carlson 2005). Additional surveys were conducted at 19 locations in the Rio Grande Valley on 12 different hosts and resulted in no additional collections of S*cirtothrips dorsalis* (Ciomperlik 2005). In total 32-33 sites have been surveyed for S*cirtothrips dorsalis* with no positive detections. At this time there is no evidence that S*cirtothrips dorsalis* is established in the natural environment. Further surveys are planned for Spring 2006 (Ciomperlik per. communication). The TDA is not taking any regulatory action in response to positive detections of S*cirtothrips dorsalis* (Floyd 2006), the lack of regulatory action is due to constraints on finances and man power (Ciomperlik per. communication). In early 2006 S*cirtothrips dorsalis* was confirmed from samples collected in Jardin La Ceiba, Puerto Rico. The initial detection was made on roses, with additional samples (awaiting confirmation) from a garden center also selling roses (Gabriel 2006). The OPIS has also followed recent detections of *Scirtothrips dorsalis* in various countries (USDA APHIS PPQ OPIS, 2006). OPIS reviewers have discussed the need to maintain the quarantine status of *Scirtothrips dorsalis* on imported commodities; at the same time, it has been recognized that maintaining such requirements on imported commodities will necessitate requirements on domestic products coming from areas where *Scirtothrips dorsalis* occurs in the US.

S*cirtothrips dorsalis* is not listed on the national CAPS list, but is listed on the citrus commodity survey for CAPS FY07 (Devorshak 2006). In 2005 New Pest Response Guidelines for S*cirtothrips dorsalis* were drafted by PDMP, but this document is in need of review and revision (Floyd, pers. comm.).

Approved PPQ Policy (March 10, 2006): NPAG recommends no change in PPQ policy regarding S*cirtothrips dorsalis* (retain as reportable/actionable).

Approved Recommendations (March 10, 2006):

1) The NPAG recommends no change in PPQ policy regarding S*cirtothrips dorsalis*, retain as a reportable/actionable pest. NPAG recommends that the regulatory status of S*cirtothrips dorsalis* be revisited pending results of commodity surveys. **Action leader: Joe Cavey PPQ-NIS.**

2) The NPAG recommends that S*cirtothrips dorsalis* be included in FY 2006 national CAPS survey in States shown in figure 1 of this report for but not limited to citrus, eggplant, tomatoes, peppers and cotton. **Action leader: Coanne O'Hern PPQ-PDMP.**

3) The NPAG recommends that the PPQ engage the National Plant Board to determine the need for:
   a. Maintaining the quarantine status of *Scirtothrips dorsalis*
   b. Broader surveillance to determine the extent of spread of *Scirtothrips dorsalis*
   c. Domestic regulations to prevent the spread of *Scirtothrips dorsalis* to uninfested areas
   d. The development of a management plan for *Scirtothrips dorsalis.*

   Action leader: Matt Royer PPQ-PDMP.

Refer to ET

References:

Bryant, W. D. (2005). Bonnie Plant Farms visit. E-mail communication to. W. H. Moore. 11/28/05.

CABI (2005). Crop Protection Compendium. Wallingford, UK, CAB International.

CABI/EPPO (1998). "Data sheets on quarantine pests: *Scirtothrips citri*."

Carlson, J. (2005). Results from sampling for *Scirtothrips dorsalis*. E-mail communication. P. E. Parker. 11/14/05.

Ciomperlik, M. (2005). Chilli thrips survey in the LRGV of Texas. E-mail communication. R. A. Vlasik, Nash, G.H., and Garcia, P.E. 11/22/05.

Clark, R. (2005). *Scirtothrips* information. E-mail communication to. P. Hornby. 12-23-05.

Devorshak, C. (2006). *Scirtothrips* - CAPS, E-mail communication to. T. Holtz. 2/28/06.

Floyd, J. (2006). RE: *Scirtothrips dorsalis* status request from CFIA and Summary. E-mail communication to. D. Kaplan. 02/09/06.

Floyd, J. (2006). Telephone conversation with J. Floyd (PDMP) on 3/2/06.

Gabriel, N. (2006). FedEx Shipment Notification. E-mail communication to. M. Ciomperlik. 2/1/06.

Garrett, L. (2004). Summary of Economic Analysis for Chilli Thrips.

GPDD. (2006). "*Scirtothrips dorsalis* HOOD 1919." Retrieved 2/17/06, 2006.

OEPP/EPPO (2005). "Bulletin OEPP/EPPO." Bulletin **35**: 353-356.

Pest Alert. (2005). "Chilli thrips *Scirtothrips dorsalis* Hood (Thysanoptera: Thripidae) A new pest thrips for Florida." Retrieved 2/16/06, 2006, from http://www.doacs.state.fl.us/pi/enpp/ento/chillithrips.html.

PIN309. (2006). " Port Interception Network, Pest interception records." United States Department of Agriculture, Animal and Plant Health Inspection Service. Retrieved 2/24/06, 2006, from http://mdrds54.aphis.usda.gov/pin309/.

Schall, R. (1995). "NPAG Data: *Scirtothrips dorsalis* Chillie (Assam) thrips."

USDA-APHIS-PPQ-CPHST (2005). "Evaluation of possible pathways of introduction for *Scirtothrips dorsalis* Hood (Thysanoptera: Thripidae) from the Caribbean into the Continental United States."

USDA-APHIS-PPQ (2005). Regulating the importation of fresh fruits and vegetables (last accessed April 28, 2005: http://www.aphis.usda.gov/ppq/manuals/), USDA.

USDA-APHIS-PPQ OPIS (Offshore Pest Information System) (2005). Reports of *Scirtothrips dorsalis* in various countries (report dates: 05/21/2004; 02/09/2006; 12/16/2005; 10/24/2005; 10/11/2005, 12/23/2004; 05/21/2004)

Venette, R. C. and E. E. Davis (2004). Mini risk assessment: Chili thrips/yellow tea thrips, *Scirtothrips dorsalis* Hood (Thysanoptera: Thripidae). St. Paul, Minnesota, USDA-APHIS-PPQ.

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Chair's Approval: /s/ Christina Devorshak for Brian Spears
Signature Date: March 3, 2006