

Best Management Practices for Renovation and New Construction

Rationale

Planning for major renovations or new construction must take into consideration all aspects of the Best Management Practices. Greenhouses must be adequately designed and constructed to facilitate sustainable operation and support the intended purpose (research, teaching and/or extension in the case of Cornell). Emphasis should be placed on good stewardship of resources, energy efficiency,

material recycling and environmental protection. Due to the quantity of chemicals, both pesticides and fertilizers, used in the greenhouse, construction and renovation must be undertaken with regard to safe storage, containment and use. Steps should be taken to inhibit electrical fire, flooding and exposure of employees to hazards. Spills and leachate must not enter the ground or nearby water sources.

Environmental Principle: Renovation and new construction projects that are well planned and executed will allow greenhouse managers to more easily manage their environmental risks. Durable, energy efficient structures maximize long-term, sustainable operation with minimal disruption to research.

| Operational Aspects | Environmental Assurance >> | | |
|-------------------------|--|--|---|
| | Level 1 | Level 2 | Level 3 |
| Overview | | | |
| Emergency Preparedness | emergency devices meet code requirements; emergency plans are in place, implemented and updated annually | emergency devices meet code requirements and alarm systems are in place; portable emergency backup equipment is available; emergency plans are in place, implemented and updated annually and portions updated more frequently as needed | emergency devices meet code requirements and facility monitoring and alarm systems are centralized; emergency equipment is integrated wherever possible, and backup systems are installed to mitigate failures; emergency plans are in place, implemented and updated to exceed minimum requirements in planning and practice |
| Environmental Awareness | a person on the project team is assigned the responsibility for integrating BMP principles into design | a person on the project team is assigned the responsibility for integrating BMP principles into design; entire project team made aware of BMP principles | the entire project team is well versed on BMP principles; the project team includes a BMP lead advisor |

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| | Level 1 | Level 2 | Level 3 |
| Training | BMP principles are circulated to the project team as design criteria | BMP principles are circulated to the project team as design criteria; BMP principles are discussed during design meetings | BMP principles are circulated to the project team as design criteria; the design team can thoughtfully discuss BMP principles as the basis for design |
| Communication | environmental issues are addressed ad hoc during design | environmental issues are systematically considered; no specific consultation and guidance by qualified personnel | qualified and experienced environmental professionals are integral to the design process; reviewed by environmental professionals when warranted i.e. construction/renovation project triggers environmental regulatory response |
| Management | | | |
| Floor Construction | solid floor; drain to sanitary sewer | solid floor; drain to sanitary sewer; floors sloped and grooved to drain properly and prevent ponding; floors are textured for non-slip surface | solid floor; drain to sanitary sewer; floors sloped and grooved to drain properly and prevent ponding; floors are textured for non-slip surface |
| Building Controls | automatic temperature control | stand-alone digital temperature and ventilation control | networked advanced digital controls for environmental systems |
| High Intensity Discharge (HID) Lighting Safety | where Metal Halide HID lighting is required for safety protective lamp lenses should be specified and maintained to protect from possible shattering glass and UV light rays | | |
| Disposal Systems (all waste systems: trash, compost, universal waste) | waste disposal complies with applicable regulations | waste disposal area provided for segregated materials and complies with applicable regulations; waste integrated into design of the facility | waste disposal area integrated into design of the facility with segregation of materials and complies with applicable applications that is under cover and protected from the weather; advanced recycling and composting with most materials recycled |

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| Water Supply (Backflow and water quality for plants, equipment maintenance and emergency water systems) | non-potable water is clearly marked that it is not potable water; backflow prevention is installed to meet codes and regulations; tempered water is supplied to all eye wash systems; main water supply is cold water | non-potable water is clearly marked that it is not potable water; backflow prevention is installed to meet codes and regulations with each injection device having an additional separate backflow device meeting codes and regulations; tempered water is supplied to all eye wash systems | water supply is tempered and cold supply is potable water; non-potable water is clearly marked that it is not potable water; plumbing is equipped with labeled valves for each with backflow prevention installed to meet codes and regulations with each injection device having an additional separate backflow device meeting codes and regulations; tempered water is supplied to all eye wash systems; water will be tested regularly; water is softened for specialized equipment |
| Secondary Containment Systems – Chemical Storage | portable systems provided where needed; no fixtures | portable systems provided where needed; some fixtures | portable systems provided where needed; some permanent secondary containment built-in, e.g., for fertilizer injection systems; secondary containment decisions are based on fertilizer storage, pesticide storage, and mixing/loading activities; frost heaving, tank seats and tank anchors are considered in designing secondary containment systems |
| Chemical Storage Area | separate designated area with an area for pesticides and another area for fertilizer storage | separate designated area with an area for pesticide and another area for fertilizer storage | storage area designed for the specific purpose of segregated storage with special features to suit facility use |
| Support Facilities | | | |
| Laundry Facilities | no special provisions are made for cleaning PPE or contaminated clothing; handlers generally wear disposable PPE when mixing, handling or applying pesticides | no special provisions made for cleaning PPE or contaminated clothing; handlers generally wear disposable PPE when mixing, handling or applying pesticides | handlers generally wear disposable PPE when mixing, handling or applying pesticides; washing machine and dryer are provided |

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| Restroom & Shower Facilities (in support of greenhouse activities) | building code requirements met; a separated clean room with lockers is available for storing and donning clean clothing & PPE | building code requirements met; ; a separated clean room with lockers is available for storing and donning clean clothing & PPE; at least one shower available to workers | building code requirements met; a separated clean room with lockers is available for storing and donning clean clothing & PPE; shower facilities with adequate locker space are provided for each sex |
| Safety | | | |
| Worker Safety | most but not all of the following are provided, but not in an organized way: eyewash, deluge shower, first aid kit, spill response kit, fire extinguishers, telephones or other 2-way communication system for emergency notification, emergency phone numbers, safety data sheets | all of the following are provided, but not in an organized way: eyewash, deluge shower, first aid kit, spill response kit, fire extinguishers, telephones, emergency phone numbers, safety data sheets | all of the following are provided in an organized way, and all staff are trained in the proper location and use: eyewash, deluge shower, first aid kit, spill response kit, fire extinguishers, telephones, emergency phone numbers, safety data sheets |