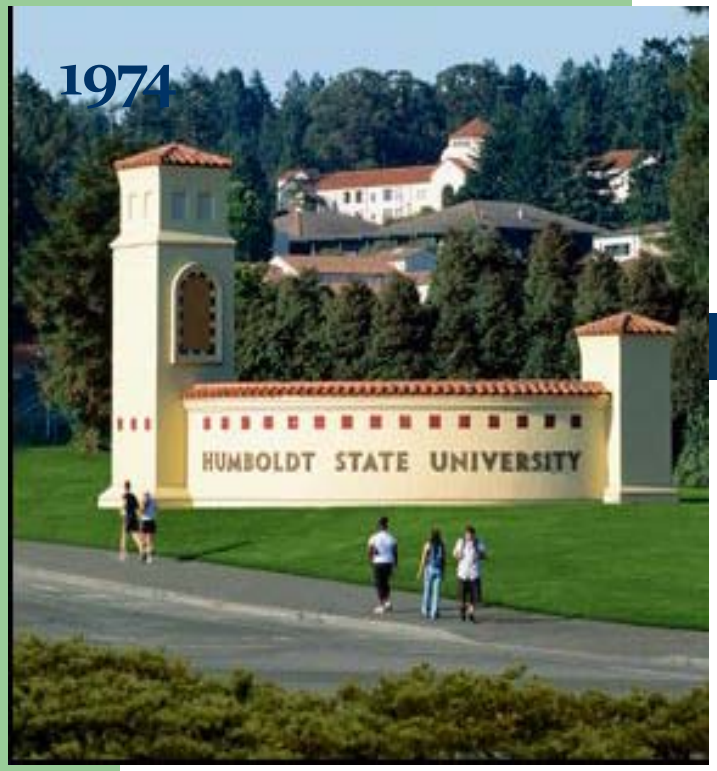

California Licensed Professional Forester

California Department of Forestry and Fire Protection

Licensed Pest Control Advisor

Retired – 35 yrs


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Closed Chain of Custody for Herbicide Use in the Utility Vegetation Management Industry

Creation of an Industry Best Management Practice

What Constitutes A Close System?

- Closed in the physical sense.
- Closed connections at transfer points.
- Tamper-evident seals (EPA Reg. 8/11/11)

Micromatic™ valve connection to Supply Container

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Why UAA is proposing a new BMP

- Proactive leadership in advance of new container regulations.
- Design the potential for errors out of, and quality into, UVM processes.
- Reduce risk of adverse exposures.
- Environmental stewardship.

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Regulatory Trends

- 2006 – New container regulations and guidance on custom formulations.
- 2007 – New labelling requirements including more specific references to appropriate container and rinsate disposal.
- 2009 – Proposed recycling initiative, which is currently tabled.
- 2011 – New regulations related to use of reusable containers including tamper evident seals.

What Is a Closed Chain of Custody?

- Focus is on the end-to-end “Supply Chain”:
  - the logistical aspects of herbicide shipping, distribution, storage and mixing.
- Includes the management of the waste stream, including rinsates and empty containers.
- “Closed” in sense of physical system.
- “Closed” in the sense of documented ownership.

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A Best Management Practice (BMP)

- The BMP joins others produced by UAA:
  - *"BMP Utility Pruning of Trees"*, 2004
  - "*BMP Integrated Vegetation Management*", 2007
  - "*BMP Western Hazard Tree Mitigation", 2009*
- It establish an end-to-end strategy for managing the chain of custody for herbicides from manufacturer to custom blender, distributor, utility owner, and applicator.
- The BMP establishes overall constructs expectations while allowing commercial variations in specific methods.

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UAA Oversight Committee

- Lynn Grayson, American Electric Power
- Steve Hopkins, USEPA
- Dave Schoonover, Aqumix
- Nick Hoffman, EcoPak
- Fred Whitford, Purdue University
- Sam Quattrocchi, Dow AgroSciences
- Jim Orr, Asplundh Tree Expert Company

First Task(Oct ‘09): Survey of Utility Vegetation Management Industry

- An internet-based survey of:
  - Current Practices
  - Experience
  - Perceptions
- Focused on herbicide handling and supply chain logistics.
- Survey population was UAA membership.
- The survey established a baseline of the “as is” situation.

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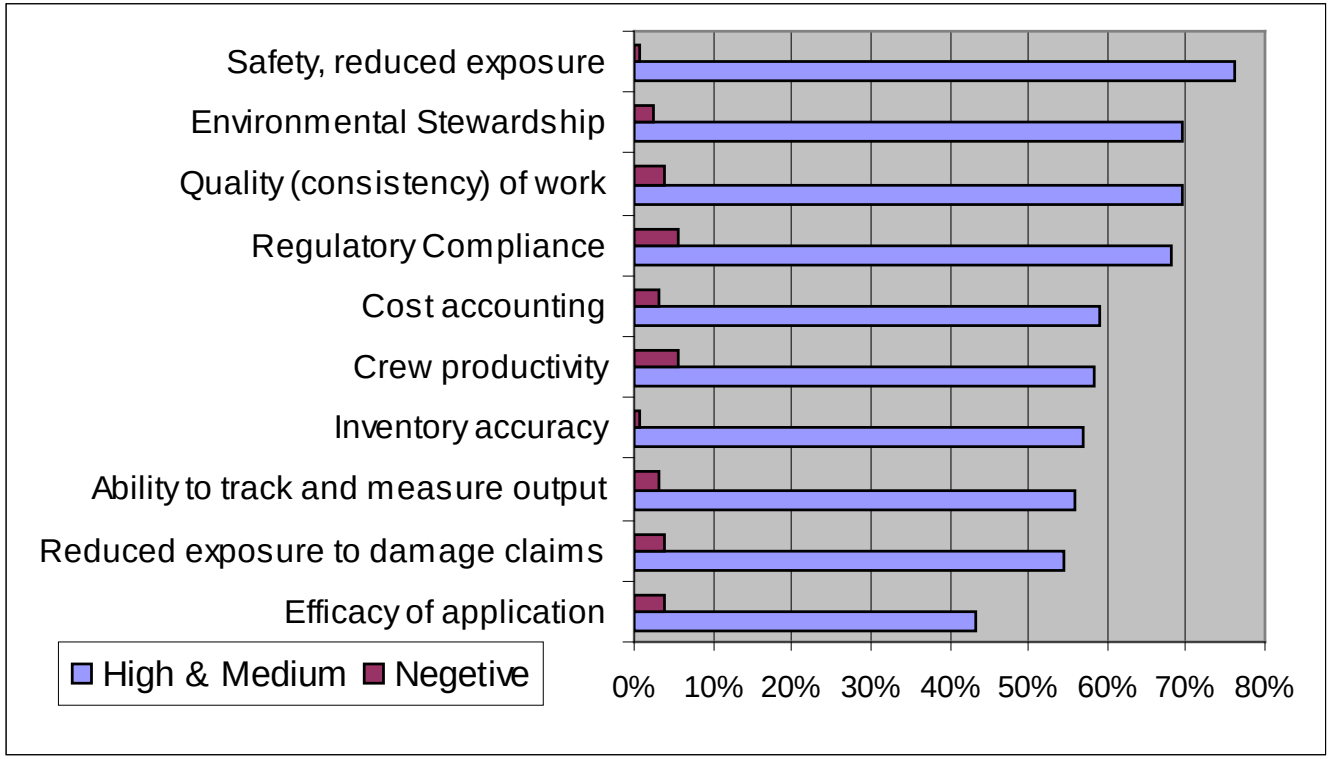
Perceived Value of CCC: Areas if Opportunity



Second Task (Q4, ‘09): Process Benchmarking

- Develop project-specific process benchmarking methods.
- The designed called for formal case studies that defined:
  - The business & regulatory environment.
  - What drives and constrains the process.
  - Process inputs and outcomes.
  - The process itself.
- An initial list of ten potential study sites were identified, and narrowed down to a final group of five.

Five Early Adopters Case Studies

- Site visits & interviews conducted in January 2010.
- Study sites:
  1. Oklahoma Gas & Electric
  2. Northeast Rural Services
  3. Duke Power
  4. Duquesne Light
  5. Alleghany Power
- Stakeholder Groups:
  - Asset Owners – the utilities
  - Service Providers – the applicators
  - Distributors
  - Custom Blenders

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Task Three (Feb,‘10): Financial Analysis of the Business Case

Development of a four-part financial model that evaluated the costs & benefits of:

1. Returnable-reusable vs. one-way disposable containers. (*the container cycle*)
2. Closed vs. open containers and system. (*the integrity cycle*)
3. Automated tracking (inventory) system vs. nothing or paper tracking. (*the custody cycle*)
4. A head-to-head cost comparison of a mixed ready-to-apply gallon using Custom Blends in R/R Supply Containers vs. conventional one-way package goods.

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Four UVM Application Variants Were Assessed

1. Low Volume (LV) Basal applications
2. LV Foliar applications
3. Conventional High Volume(HV) Foliar (a.k.a “hydraulic foliar”) applications
4. Aerial applications

Each are different enough in method, formulation, and cost to warrant their own financial analysis.

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Direct Costs Included in the Analysis:

- Includes costs of all A.I.'s, diluents, adjuvants, mixing fees, etc.
- Includes capital cost of set-up. e.g. modification to application equipment, acquiring fleet of containers, etc.
- Includes variable cost implications such as:
  - Impact on crew productivity
  - Cost of container and rinsate disposal.
- Includes logistical costs such as shipping and inventory.

Lowest common denominator ("apples to apples"):
The full cost of a mixed and ready-to-apply gallon.

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Indirect Costs and Benefits, a.k.a. “Channels of Value Creation”

- Regulatory Compliance
- Safety
- Efficacy
- Quality
- Risk Management
- Environmental Stewardship

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Results of Financial Analysis

(5-yr NPV on a *Ready-to-Apply Gallon basis)*

Application Type	R/R Supply Container	Closed System Fittings	R/R Closed Supply Container	Tracking	Buy as Custom Blend	All BMP Elements
RTA: LV Basal	$1.13	($0.64)	$0.49	$0.07	$0.25	$0.81
DC: LV Foliar	$0.08	$0.00	$0.08	$0.00	($0.04)	$0.04
DC: HV Foliar	$0.04	($0.01)	$0.03	$0.00	$0.01	$0.04
DC: Aerial	$0.12	($0.05)	$0.07	$0.02	$0.42	$0.51

The Financial Business Case "White Paper"

- A financial business case study related to adoption of the new BMP has been produced.
- It is based on practices defined in the BMP.
- It is intended to provide decision makers with a thorough assessment, comparing the traditional approach (open system, disposable containers) to the new BMP.

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Task Four: Establishing the new "Closed Chain of Custody" BMP

- March 2010 – Conducted concurrently with development of the Financial Business Case.
- An iterative collaborative process using Delphi Analysis techniques.
  - An initial hybrid BMP based on the five benchmark studies was developed.
  - A small expert stakeholder group of UAA members provided feedback.
  - A second, larger general stakeholder group validated the BMP.

BMP.1 - Use of Returnable Reusable Supply Containers

Returnable Reusable (R/R) Supply Containers:

- Are returnable, reusable, and ultimately recyclable.
- Meet UN/DOT Class II requirements.
- Have an expected service life of 5 years or 30 return cycles.
- Graduated with English and metric unit scales

BMP.1 - Each R/R Supply Container is Labeled

- A unique ID (bar code).
- EPA product registration numbers and product labels.
- Concentrations of all ingredients.
- A reference to the specific lot or batch contained therein.
- Application equipment-specific mixing/dilution instructions.
- Specific to the Utility project and Applicator

BMP.2 - Use of Reusable Service Containers

- Service Containers are used to provide small quantities of herbicide solutions from larger containers to crews.
- The *preferred practice* is to include closed filling connections.
- The “reuse” of package good containers violates regulations

Transfer from Supply Container to Service Container via closed connections.

BMP.3 - Use of Closed Connections at Transfer Points

- The BMP promotes the use of closed interlock valve connections at each transfer point

Micromatic™ vented valve coupler on supply container

BMP.3 - Use of Closed Connections at Transfer Points

- A closed connection involves a positive interlock valve or fitting.
- It is a mechanical, leak-proof connection.

Camlock valve connection to spray tank

BMP.3 - Use of Closed Connections at Transfer Points

- Transfer is accomplished by a dedicated chemical resistant pump.
- Transfer pumps can be either mechanical or manual.

Shurflow 10 GPM Chemical Transfer Pump

BMP.3 - Use of Closed Connections at Transfer Points

- There is a closed connection between Supply Container and the Applicator's equipment.
- The *preferred practice* is to maintain the closed system all the way to the backpack or other small spray equipment receiving a ready-to-apply mixture.

Camlock connection to backpack

BMP.4 - Measuring Quantities of Custom Blends

The intent of the BMP is to reduce or eliminate the need for field measurement of quantities of the individual herbicides and adjuvants contained in the specific spray mix.

- Custom Blends supplied in the form of Ready-to-Apply formulations do not require measuring and mixing prior to use.
- The *preferred practice* is to use Custom Blends in R/R Closed Supply Containers with capacities and at concentrations that result in a 1:1 ratio of a Supply Container volume to Mix Tank or Spray Tank volume.

BMP.4 - Measuring Quantities of Custom Blends

When necessary to mix at ratios other than 1:1 then:

- Amount of Dilute Concentrate required should be measured in full units
- Units should be consistent with the graduated markings on the supply container.
- The volume of any existing spray mixture in the tank should be determined.
- The volume of diluents being added to the partial tank should be determined by measurement.

BMP.5 - Closed System Measuring

The *preferred practice* is to maintain a closed system during the measuring process using:

- Calibrated transfer pumps or flow meters.
- Intermediate fixed volume transfer vessels
- Translucent graduated Supply Containers and mix/spray tanks, which allow the applicator to determine liquid levels.

BMP.6 - Herbicide Formulations Being Supplied

- The *preferred practice* is for custom herbicide blends being supplied to be as complete and all-inclusive as possible.
- BMP promotes standardization on fewer core mixes.

- BMP recognizes the need for an adaptive IVM strategy involving changes in Ready-to Apply mixtures at the time of application.
- BMP recognizes need for concentrated forms of herbicides. (a.k.a. “package goods”)
- BMP recognizes that dry flowables do not stay in suspension and are added during mixing.

BMP.7 - Mixing

- The addition of Concentrates and Dilute Concentrates to the spray or mix tank occurs on the ROW job site and at least 100 feet away from water crossings and wetlands.
- Mixing should not be done at any location where water being used as a diluent is being acquired.
- Maintain a visible air gap between a water supply line and mix/spray tank and/or use an anti-siphon check valve when acquiring water.

BMP.8 - Tracking and Record Keeping

- Container tracking included as part of the daily spray report.
- The BMP anticipates advances in information technologies.
- The *preferred practice* includes application tracking systems in the form of an electronic record that can be accessed remotely.
  - The Utility should have access to tracking data and documentation.
  - Other stakeholders should have access to data, as appropriate to their needs.

BMP.9 - Inventory Management

- This BMP is intended to create a system that allows an applicator to reduce the quantity of herbicide stored in inventory at any given time.
- The *preferred practice* is “just-in-time” inventory management.
- Regulations related to custom blends prohibit Custom Blenders from producing Dilute Concentrates on a speculative basis
- The inventory of herbicides should be held in secure storage with access restricted to authorized, qualified personnel.

BMP.10 - Handling of Empty R/R Closed Supply Containers

- Minimize container damage, wear and tear.
- Maintain integrity of container closure and tamper-evident seals.
- R/R Closed Supply Containers cannot be refilled by Applicators or Distributors.

Miss match of containers!

BMP.10 - Handling of Empty R/R Closed Supply Containers

- Goal is return of empties to the Custom Blender in 30 days, not to exceed 60 days.
- Empty containers may be held until a full pallet of containers is accumulated.

Pallets of empties ready for back haul

BMP.11 - Refilling Reusable Closed Supply Containers

- The Custom Blenders each manages a fleet of R/R Closed Supply Containers.
- R/R Closed Supply Containers are inspected to assure the integrity of each vessel prior to reuse.
- R/R Closed Supply Containers are "*product-dedicated*".
- R/R Closed Supply Containers are tracked on each turn.

Refilling operations at Custom Blender

BMP.12 - Decommissioning R/R Closed Supply Containers

- R/R Closed Supply Containers are decommissioned and disposed of by Custom Blenders.
- The BMP promotes recycling of R/R Closed Supply Containers at end of their useful service life. *(5 years or 30 turns)*
- R/R Closed Supply Containers that are retired cannot be re-purposed.
- Each container's unique ID number is retired and a record of the ultimate disposal maintained.

BMP.13 - Use of Traditional One-Way Disposable, Open Containers

The BMP recognizes that package good products supplied in single use disposable one-way containers will continue to be used:

- Small projects (<60 gallons, 4 -15 gal containers).
- Small applicator (<270 gal./yr., 2 pallets of 9 - 15 gal containers).
- Short interval projects, immediate demand, no time to receive a custom blend.
- When there is a need to add additional Active Ingredients, and adjuvants due to changing site conditions (a.k.a. “adaptive IVM).
- When using a dry flowable that is otherwise unstable in a custom blend.

BMP.13 - Use of Traditional One-Way Disposable, Open Containers

Empty one-way container regulations require:

- Container to be filled to 25% volume for each of three rinses to achieve 99% decontamination. This means that the total volume of rinsate will be the equivalent of 75% of the volume of each one-way container.
- Rinsing be done “promptly”, reducing the practice of gathering up and storing empties for rinsing later off-site in large batches.

BMP.14 - Commercial Considerations

- The BMP is intended for specific reference in Utility IVM services procurement specifications.
- This BMP is intended for use by Applicators in purchase agreements for herbicides.
- The *preferred practice* is for the Applicator to purchase herbicide concentrates, Custom Blends, and Ready to Use formulations.

BMP.15 - Quality Compliance Audits

- The Utility should have Quality Assurance processes that including audits of supply chain from order, through application and return of empty returnable/reusable container. *"Trust But Verify".*
- Quality Control processes including documentation that demonstrates compliance:
  - Custom Blenders & Distributors – That formulations being formulated and supplied to Applicator are as specified.
  - Applicators - The formulations specified by the Utility are what has been purchased and applied
- The Custom Blender should retain samples of each batch of Dilute Concentrate produced.

Implementation Materials

Currently available on the UAA web site:

- The new CCC BMP
- The Economic Business Case White Paper
- The detailed Final Report

http://www.utilityarborist.org/

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Implementation Materials

Currently in development:

- A list of Frequently Asked Questions (FAQ).
- High level project announcements.
- A “foreman friendly” pocket field guide version of the CCC BMP.
- A Spanish language version of the pocket field guide is being considered.

Communication

- Presented the new BMP to the UAA at Annual Conference in Chicago, July 2010
- Featured article(s) in *UAA Quarterly*.
- Presentations at VM Industry meetings.
- Possibility of include the new BMP at UAA regional meetings.
- Promoting the new BMP in trade publications.

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Summary

- The new BMP establishes an end-to-end strategy for managing the chain of custody from manufacturer to custom blender, distributor, utility owner, and applicator.
- It establishes constructs that accommodate commercial variation.
- It is expected to reduce the risk of potential mixing error, public and applicator exposure, and inappropriate disposal of wastes.
- It is available for incorporation in UVM vegetation management specifications.

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Thank You…..

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