



AUSTRALIAN MEAT PROCESSOR CORPORATION

# AMMONIA REFRIGERATION PLANT OPERATOR TRAINING



# Ammonia refrigeration plant operator training

- Industry ownership of training
- Plant operator input
- Australian available training

# World Search for best practice

- Difficulties around the world in getting good training for operators
- RETA and training in North America
- An alliance for MINTRAC and RETA
- Accreditation and RETA training

# Aim for the training

- Role of meat processing companies in determining
  - Course content
  - Course delivery
  - trainers
  - Assessment of competency
- On going relationship with RETA

# Contents

- Ammonia operator training in the US – RETA training materials
- TAFE modules and how these line up with US training
- Experiences with the US material
- Topics we would like to develop within the course

# Key refrigeration industry bodies in the USA

- IIAR (International Institute of Ammonia Refrigeration)
  - Engineers, Contractors and Equipment suppliers
  - Develops codes and standards for NH<sub>3</sub> and CO<sub>2</sub>
  - Government lobbying
  - International activities
- ASHRAE (Associate Society for Heating Refrigeration and Air conditioning Engineers)
  - Overarching industry body for both Refrigeration and A/C
- RETA (Refrigeration Engineers and Technicians Association)
  - Ammonia plant operators
  - Training and CPD for operators and maintenance engineers



## RETA TRAINING

Helping you become a master at your job, **RETA** offers on-line training materials and other industry standard information that a member can access through the Member's Area on the **RETA** website. In addition, there are a multitude of learning opportunities offered at **RETA's** Annual National Conference and many educational/safety seminars available at various locations throughout the country during the year.

RETA has developed four training books

Book 1 – Basics


Book 2 – Advanced

Book 3 – Troubleshooting and maintenance

Book 4 – US regulations

## CERTIFIED ASSISTANT REFRIGERATION OPERATOR (CARO)

An entry-level examination designed to identify whether an operator has the basic knowledge to function safely in an engine room under the supervision of a more experienced operator. There are no minimum experience requirements.



## CERTIFIED INDUSTRIAL REFRIGERATION OPERATOR (CIRO)

This examination is for operators with at least two years experience. Satisfactory completion of recommended **RETA** courses is suggested for a successful outcome, but does not guarantee a passing score on the CIRO exam.

# RETA book 1

- Chapter 1 reviews fundamental items used by the plant operator in the course of his / her duty.
- Chapter 2 covers the refrigeration cycle.
- Chapters 3 and 4 contain information on the physical properties of refrigerants.
- Chapters 5 through 9 cover the basic components of the refrigeration cycle.
- Chapter 10 explains purging non-condensable gases from the refrigeration system.



# RETA book 2

- Chapter 1 introduces heat transfer principles.
- Chapter 2 introduces the enthalpy diagram.
- Chapter 3 introduces the relationship of water vapor in air and how it affects a refrigeration system.
- Chapter 4 introduces how liquid refrigerant is fed to evaporators and lowside vessels.
- Chapter 5 discusses direct expansion evaporators.
- Chapter 6 discusses forced liquid recirculation systems.
- Chapter 7 discusses gravity flooded evaporators.
- Chapter 8 discusses non-evaporating heat transfer coolants.
- Chapter 9 discusses two stage systems and introduces cascade refrigeration systems.
- Chapter 10 addresses defrost systems.

# Australia TAFE modules

- Two modules currently registered and available for training
- UEENEEJ178A Apply safety awareness and legal requirements for ammonia refrigerant
  - Prepare to work with ammonia
  - Apply safe working practices to Ammonia refrigerant
  - Follow workplace procedures for hazard identification and risk control of Ammonia refrigerant
- UEENEEJ196A Operate Ammonia Refrigeration Plant
  - Prepare to operate Ammonia refrigerant plant
  - Operate Ammonia refrigeration plant
  - Complete work and report on operating Ammonia refrigeration plant

# Alignment of RETA and TAFE courses

- RETA Books 1 and 2 cover the bulk of the requirements for the TAFE courses. Translated to SI units by Mintrac
- RETA powerpoint material limited and dated
- Cooling tower maintenance and water treatment as well as energy efficiency was added to Mintrac course in response to industry request
- *AIRAH DA18 Application Guide – water treatment* added as resource material
- AMPC Energy Efficiency white papers added as resource material
- New Powerpoint material was developed to complement RETA material and fill gaps, drawing from various other documents, including
  - RETA slides
  - Harvey Goldsmith training slides
  - Ammonia Data Book
  - Minus40 internal materials

# Current course structure – theoretical component

- Part 1 – Introduction
  - 1 x 2 day session of course material
  - 1 x 1 day session of revision and exam
- Part 2 – Advanced
  - 1 x 1day session held after Part 1
  - 1 x 2 day session of revision, course material and site visit/analysis
  - 1 x 2 day session of revision, one-on-one review sessions and final exam
- Students are required to prepare a mudmap of their own plant for analysis during one-on-one
- Part 1 aligns with RETA CARO course
- Part 2 aligns with RETA CIRO course
- Students who have completed the training can sit RETA exams directly

# Experiences with training materials to date

- RETA Books
  - Contain a number of technical inaccuracies
  - Covers some redundant technology, such as vane compressors, pumper drums
  - Too much emphasis on Halocarbon systems
  - Do not sufficiently cover new technologies, like plate heat exchanger applications
  - Do not cover large scale plate freezers
  - Some homework Q&A inaccurate
  - Generally require an update

# Material we would like to add

- Resource material and slides:
  - More content on PLCs, SCADA systems and controls generally, not covered by RETA books
  - A section specifically on valves and instrumentation and how they work
  - More info on design and operation of large-scale plate freezers
  - Modern technology, such as latest control valves, oil management, instrumentation
- Resource material only
  - Resource material on specific regulatory requirements in Australia (equivalent of RETA Book 4 for Australia)
- Exam and homework questions on all course additions (currently using RETA exams and homework only)

# Wrap up

- MINTRAC's role
- Structure of the course
- Expectation of students
- Next steps

Helped me gain knowledge that I didn't know. I will be able to use this knowledge when I go back to work."

"Very well structured/organised. Starting from basics and then getting into deep technical terms. The way that the course was delivered was genius as it gave us enough time to study and exercise. Text book and resources were very helpful."

Helped me familiarise with own plant, revealed to me what other options are out there, put me in touch with people who could be able to help rectify current plant inefficiencies"

"A much better understanding of how ammonia works and its characteristics. Give an understanding of what is happening within a plant."