



**CENTER FOR RESEARCH AND  
ADVANCED STUDIES OF THE  
NATIONAL POLYTECHNIC INSTITUTE**

# **THE NEW ANIMAL FACILITY AT CINVESTAV**

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**GENERAL CONSIDERATIONS**

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# GENERAL CONSIDERATIONS

## TOTAL SPACE

- 2,600 m<sup>2</sup>. (27,986 ft<sup>2</sup>)
- SMALL RODENTS UNIT  
1,800 m<sup>2</sup>. (19,375 ft<sup>2</sup>)
- OTHERS SPECIES- 800 m<sup>2</sup>  
(8,611 ft<sup>2</sup>)(near future)

# GENERAL CONSIDERATIONS

## GOALS

TO BREED AND HOUSE  
SPF/MPF RATS, MICE AND  
OTHER SMALL RODENTS  
ACCORDING TO THE NEEDS OF  
EACH OF THE EIGHTEEN  
DIFFERENT BIOMEDICAL  
RESEARCH PROGRAMS AT  
CINVESTAV

# GENERAL CONSIDERATIONS

## GOALS

WITH HIGH QUALITY  
ENVIRONMENTAL  
CONDITIONS, MANAGEMENT,  
E.E. PROGRAM, CARE AND  
WELFARE OF ANIMALS  
ACCORDING TO THE NEEDS OF  
EACH BIOMODEL

# GENERAL CONSIDERATIONS

## GOALS

IN THE BEST WORK ENVIRONMENT FOR PERSONNEL, WITH THE USE OF PPE AND SAFE CONDITIONS TO REACH THE MAXIMUM RESULTS AND PRODUCTIVITY.

# GENERAL CONSIDERATIONS

## HOUSING CAPACITY

6,000  
MICROISOLATOR  
CAGES TO HOUSE  $\approx$   
25,600 MICE, RATS,  
HAMSTERS &  
M.GERBIL

# GENERAL CONSIDERATIONS

ANNUAL  
PRODUCTION

ESTIMATED BETWEEN  
35,000 TO 50,000  
RODENTS OF 65  
DIFFERENT BIOMODELS  
WITH 80% OF THE  
ANIMAL MODELS

- transgenic
- immunodeficient
- SCID
- knockout



# FACILITY FEATURES

RODENTS  
HOUSING

CURRENT  
AND  
FUTURE  
HOUSING  
CAPACITIES

## CURRENT CAPACITY

HOUSING SPACE	3,000 m <sup>2</sup>
# OF CAGES	3,130
# OF RODENTS	14,200

## FUTURE CAPACITY

HOUSING SPACE	1,800 m <sup>2</sup>
# OF CAGES	6,000
# OF RODENTS	26,600



# FACILITY FEATURES

# 3 LEVELS OF ANIMAL HOUSING AND SERVICE AREAS

# 1ST LEVEL

# BREEDING OF TG, KO, ID, SCID MODELS AND WASHING, DISINFECTION, STERILIZATION AND ANIMAL DELIVERY AREAS



# FACILITY FEATURES

2ND  
LEVEL

BREEDING OF WIDELY USED RAT  
STRAINS AND OTHER RODENTS  
(e.g. HAMSTERS, M.GERBIL, ETC.)



# FACILITY FEATURES

3RD  
LEVEL

HOUSING ALL RODENTS UNDER  
APPROVED IACUC ANIMAL USE  
PROTOCOL



# FACILITY FEATURES

# 3RD LEVEL

## TWO ABSL-2 ROOMS FOR WORK WITH PATHOGENS





# FACILITY FEATURES

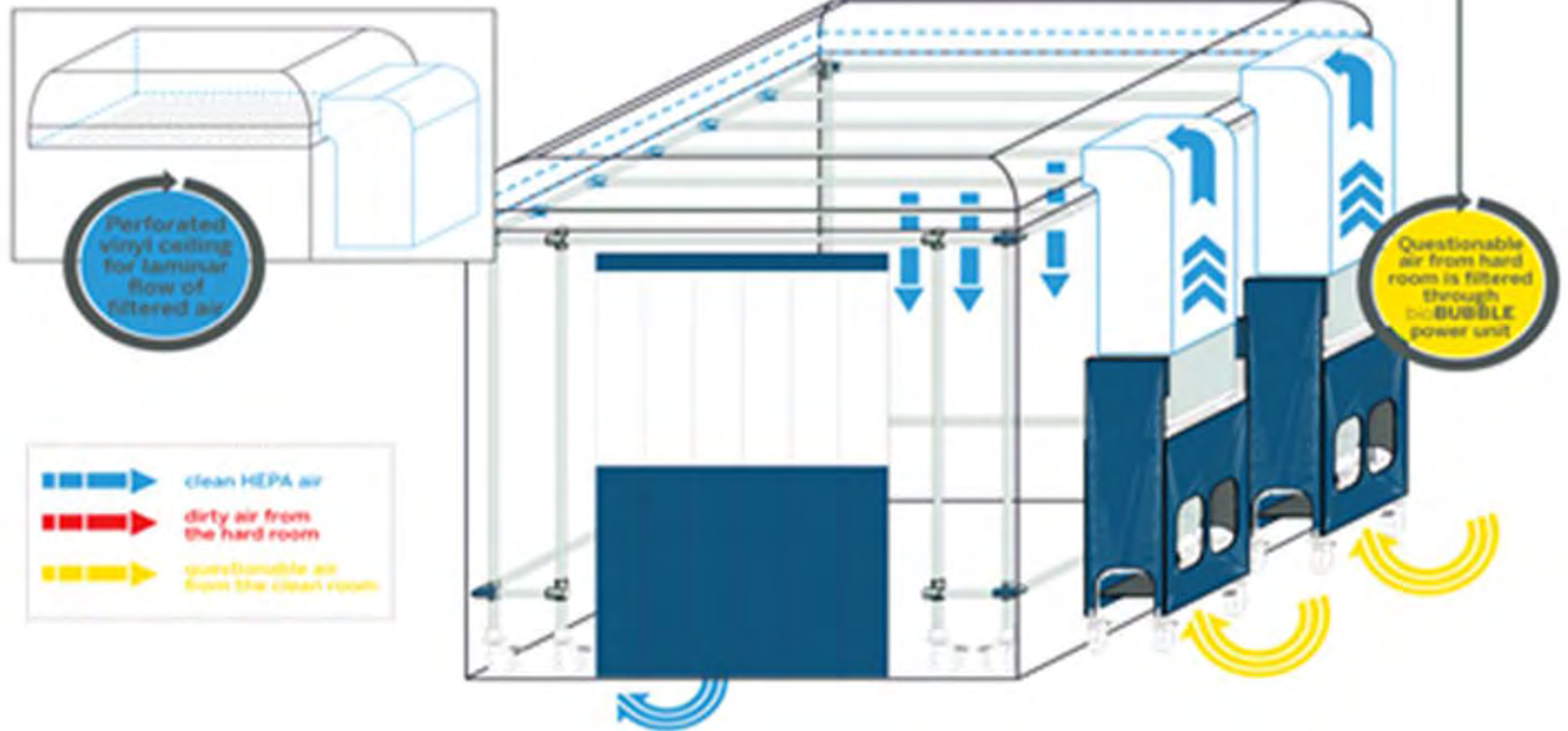
ANIMAL  
HOUSING IN  
BIOBUBBLE  
CLEAN ROOMS



# ANATOMY OF THE CLEAN ROOM

bioBUBBLE creates Ultra-Clean environments for housing sensitive animal models and for a wide variety of procedural, surgical and imaging applications.

**100%**  
HEPA FILTERED  
SUPPLY AIR



# FACILITY FEATURES

CLEAN ROOMS  
AND OTHER  
ASSOCIATED  
TECHNOLOGIES  
USED IN THIS  
FACILITY

12 CLEAN ROOMS

2 ABSL2 ROOMS (+/-/+)

7 AIR SHOWERS

7 AIR LOCKS



# FACILITY FEATURES

AIR SHOWERS  
IN ALL ENTRY  
AREAS  
(LOCKER  
ROOMS AND  
GOWNING  
AREAS)



# FACILITY FEATURES

TWO ABSL-2  
ROOMS TO  
WORK WITH  
PATHOGENS  
(PRIMARILY  
PARASITES)



# FACILITY FEATURES

TRANSPORT  
RACKS WITH  
COVERS FOR  
MOVEMENT  
OF CLEAN AND  
DIRTY  
MATERIALS  
THROUGH  
FACILITY



# FACILITY FEATURES

AIR LOCKS FOR  
ENVIRONMENTAL  
SEPARATION  
BETWEEN AREAS  
OF DIFFERENT  
AIR QUALITY



# FACILITY FEATURES

ALL CLEAN ROOMS  
IN THE 3<sup>RD</sup> LEVEL  
HAVE SECURE  
ELECTRONIC  
ACCESS DOORS





# FACILITY FEATURES

THERE ARE 8 HARD-  
WALLED ROOMS  
WITH ELECTRONIC  
ACCESS FOR  
ANIMALS WITH  
SPECIAL USE  
PROTOCOLS



# FACILITY FEATURES

ONE ROOM FOR  
AQUATIC SPECIES  
(e.g. FISH,  
ACOCILES,  
TURTLES)



# FACILITY FEATURES

ANIMAL  
HOUSING

MODELS AND  
QUANTITY OF  
HIGH DENSITY  
VENTILATED  
RACKS

MODEL/TYPE	QUANTITY
ONE CAGE 2100	25
SUPER MOUSE 750	5
SUPER MOUSE 1800	12
SUPER RAT 1400	8
CHANGING STATIONS	10
ALERT SYSTEMS	36



# ONE CAGE 2100 (25)



## HOUSING CAPACITY

- 768 RATS  $\leq 100$  g
- 2,240 MICE  $\leq 10$  g
- 1,334 HAMSTER  $\leq 60$  g

# SUPER MOUSE 750 (5)



## HOUSING CAPACITY

- 1,920 MICE  $\leq$  10 g

# SUPER MOUSE 1800 (12)



## HOUSING CAPACITY

- 2,400 MICE  $\leq$  10 g

# SUPER RAT 1400 (8)

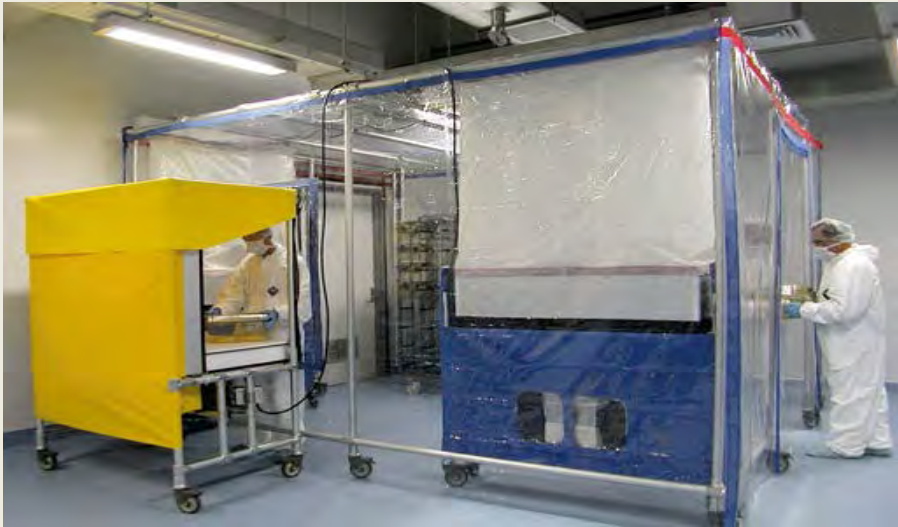


## HOUSING CAPACITY

- 640 RATS  $\leq 100$  g
- 1,840 MICE  $\leq 10$  g
- 1,120 HAMSTERS  $\leq 60$  g



# CHANGING STATION (10)



4 AND 6 FT  
CHANGING STATIONS  
FOR ANIMAL CAGE  
CHANGE PROCEDURES



# ALERT SYSTEM (36)



EACH VENTILATED RACK IS CONNECTED TO A DETECTION SYSTEM, MONITORING SET POINT VARIATIONS IN ENVIRONMENTAL CONDITIONS (e.g. TEMPERATURE, HUMIDITY, LIGHT INTENSITY AND POWER FAILURE) AND SENDING IMMEDIATE ALERTS VIA SMS AND EMAIL MESSAGES TO SMARTPHONES

# MICRO ENVIRONMENT MONITORING



EACH VENTILATED  
RACK CAN MONITOR  
THE PRESSURE ( $\pm$ ),  
TEMPERATURE,  
HUMIDITY, PREFILTER  
STATUS AND WORK  
HOURS FOR FOUR AIR  
SUPPLY AND EXHAUST  
MOTORS



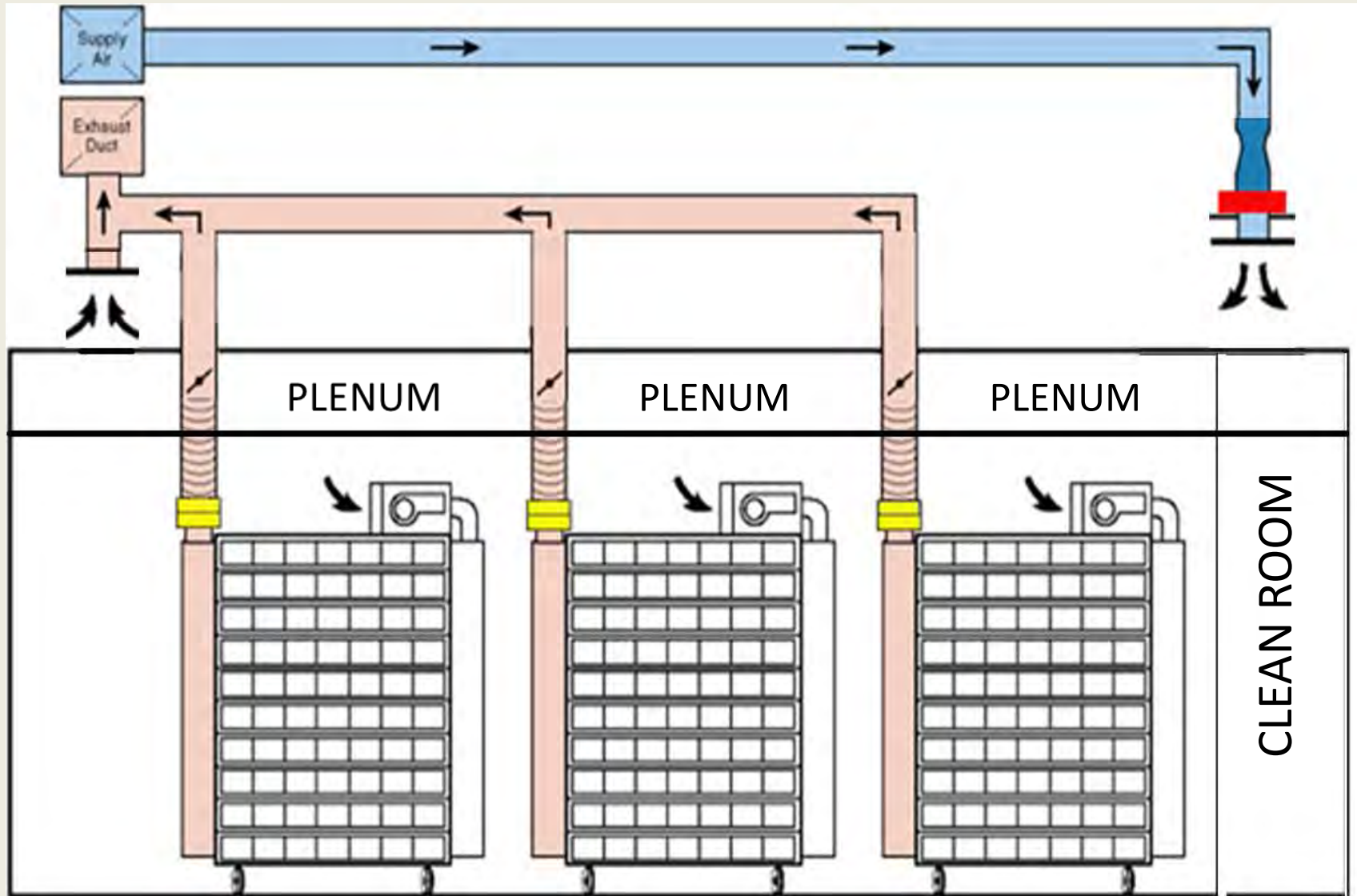
# MICRO ENVIRONMENT MONITORING



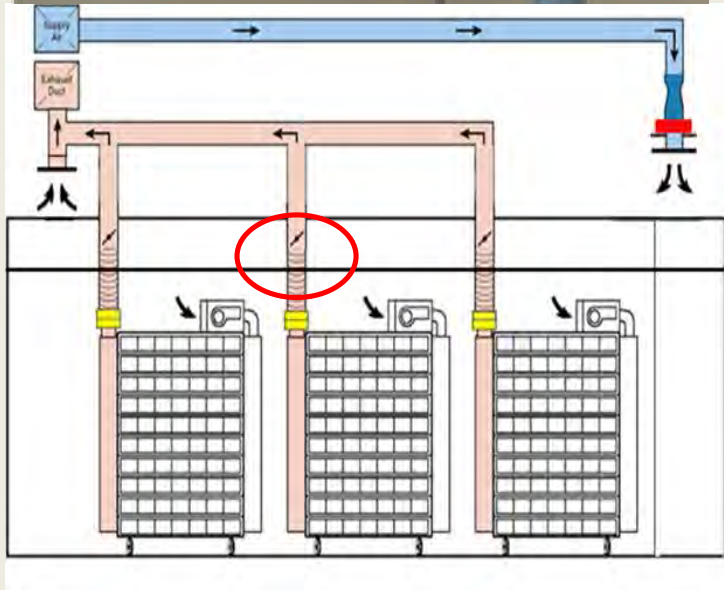
TO MONITOR ROOMS OR AREAS WITHOUT ENVIRONMENTAL CONTROL SENSORS, THERE ARE DATA LOGGERS TO MONITOR TEMPERATURE, HUMIDITY AND LIGHT INTENSITY



# DIAGRAM OF THE RACK AND CLEAN ROOM EXHAUST CONNECTION WITH THE CENTRAL HVAC SYSTEM

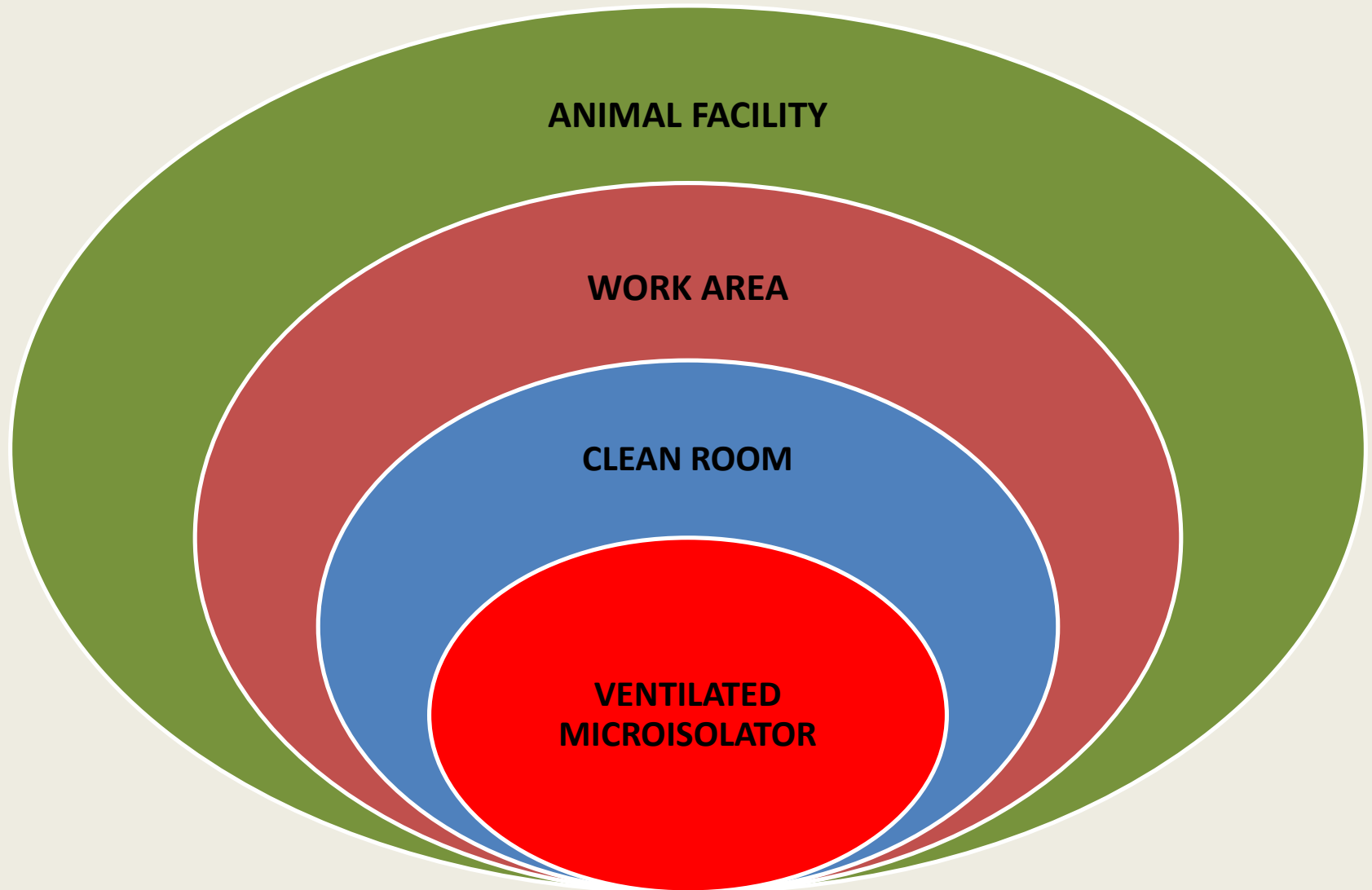


# ADVANTAGES



- BALANCED AIR FLOW
- LESS  $\text{NH}_3/\text{CO}_2$  CONTAMINANTS
- DRYER BEDDING
- BETTER QUALITY AT CAGE LEVEL ENVIRONMENT
- MORE TIME BETWEEN BEDDING CHANGE WITH LOW ANIMAL DENSITY

# BARRIER SYSTEM



# OTHER HOUSING SYSTEMS

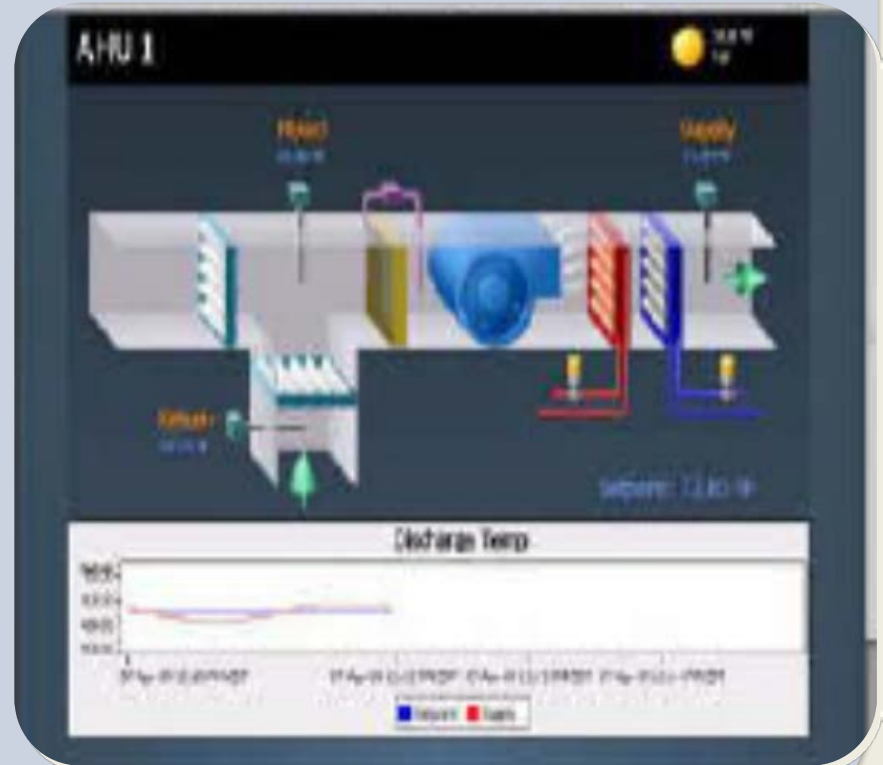


SEMIRIGID ISOLATORS FOR  
BREEDING AND HOUSING  
GERM-FREE AND  
IMMUNOCOMPROMISED  
RODENTS

# FACILITY FEATURES

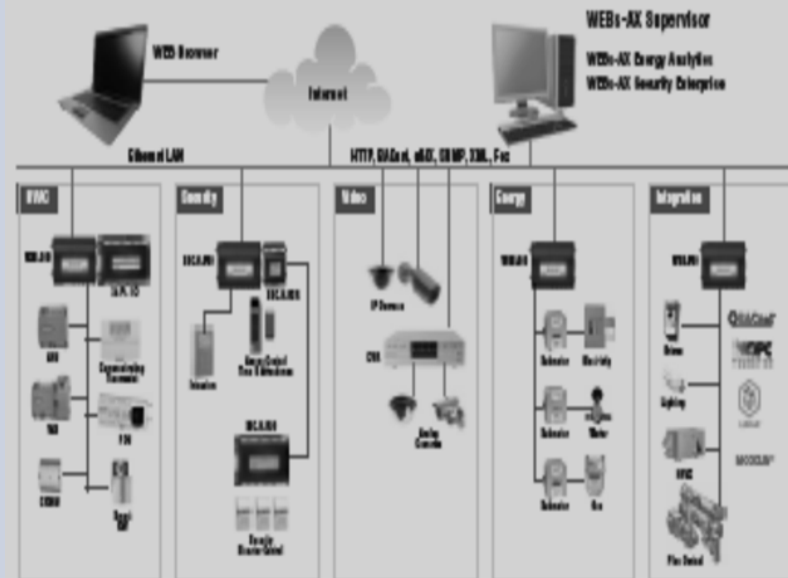
## HVAC SYSTEM

WEB STATION – AX  
HONEYWELL WITH WEB  
ACCESS



# HVAC SYSTEM

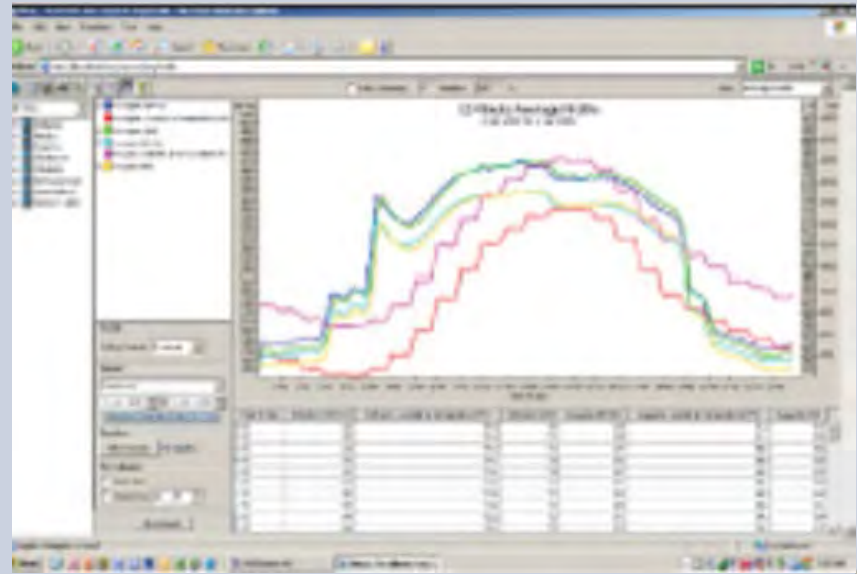
## Honeywell Building Integration



# FACILITY FEATURES

HVAC  
SYSTEM

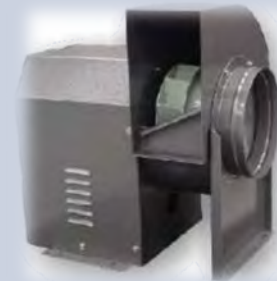
WEB STATION – AX  
HONEYWELL MONITORS  
AND RECORDS  
ENVIRONMENTAL  
PARAMETERS



# FACILITY FEATURES

## HVAC SYSTEM

24/7 CONTROL OF  
TEMPERATURE ( $21 \pm 2$ ),  
HUMIDITY (30-70%) AND  
AIR PRESSURE

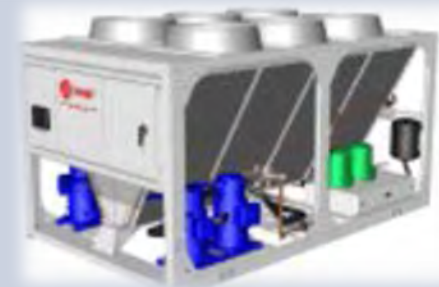




# FACILITY FEATURES

## HVAC SYSTEM

REDUNDANCY IN ALL  
HVAC SYSTEMS



# FACILITY FEATURES

## HVAC SYSTEM

24/7 MONITORING VIA  
WEB WITH IMMEDIATE  
REPORTING OF ANY  
VARIANCE THROUGH  
EMAIL TO SMART PHONES



# FACILITY FEATURES

CCTV

CCTV IN ALL CRITICAL  
POINTS (ACCESS AND  
WORK AREAS) WITH  
CONTROL & ACCESS VIA  
WEB FROM ANYWHERE



# FACILITY FEATURES

BIOMETRIC  
AND  
ELECTRONIC  
ACCESS IN  
MAIN DOOR  
AND ALL  
ACCESS DOORS

BOTH SYSTEMS INSTALLED  
IN THE MAIN ENTRANCE  
AND ALL BUILDING LEVEL  
ACCESS AND SERVICE  
AREAS WITH  
PROGRAMMABLE AND  
RECORDED PERSONNEL  
ENTRIES



# FACILITY FEATURES

FUME  
DETECTION,  
FIRE ALARMS  
AND WATER  
STORAGE

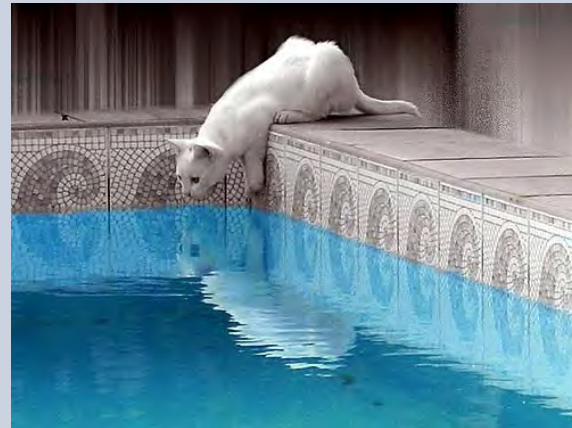
FUME ALARMS AND FIRE  
DETECTION SYSTEM  
CONNECTED TO THE  
WATER STORAGE



# FACILITY FEATURES

## WATER STORAGE

7,000 GALLONS OF WATER  
STORAGE TO GUARANTEE  
ENOUGH WATER FOR  
ANIMAL SUPPLY AND FIRE  
ALARMS IN CASE OF  
EMERGENCY





# FACILITY FEATURES

RACKS AND TUNNEL  
WASHERS WITH ENERGY  
AND WATER EFFICIENCY  
PROGRAMS AND  
COMPLETE CYCLE OF  
SOILED BEDDING  
DISPOSAL, PREWASH  
DISINFECTION, RINSE,  
DRY AND BEDDING  
DISPENSING



# FACILITY FEATURES

BULK AND MEDIUM  
SIZE AUTOCLAVES  
(4.21 M<sup>3</sup> – 1,100  
GALLONS) AND (1.52  
M<sup>3</sup>- 335 GALLONS  
CAPACITY) WITH  
ENERGY AND WATER  
SAVING & EFFICIENCY  
PROGRAMS



# FACILITY FEATURES

TWO  
HYDROPAC  
SYSTEMS  
AWS-2500



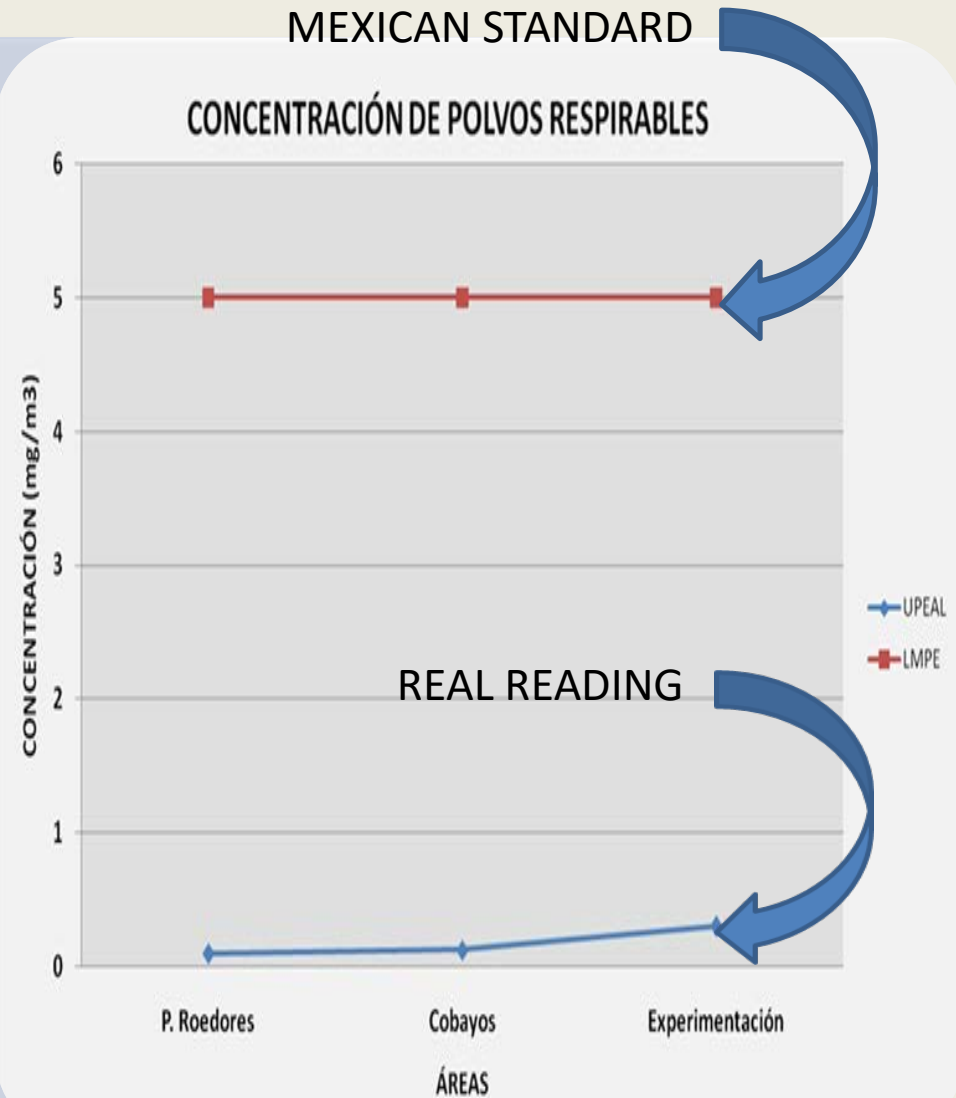
# FACILITY FEATURES

## INNOVATIVE SHOE COVER DISPENSER SYSTEM (KINETIC BUTLER)



# FACILITY FEATURES

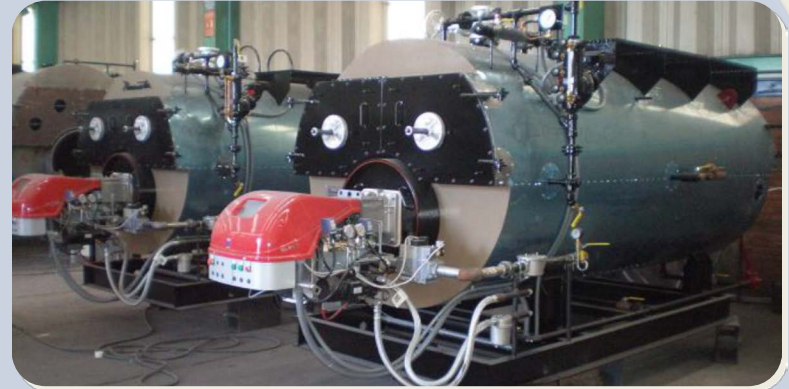
ALL PERSONS WHO  
WORK IN THIS FACILITY  
WILL WORK IN THE  
BEST ENVIRONMENTAL  
CONDITIONS,  
SURPASSING THE  
MEXICAN STANDARD  
OF “BREATHABLE DUST  
CONCENTRATION”





# FACILITY FEATURES

ROOM MACHINES  
WITH TWO STEAM  
BOILERS UNITS OF 80  
HP EACH, A 10,000  
LTS OF SOFT AND  
HOT WATER STORAGE  
TANK (149°F), A 400  
KVA POWER PLANT  
AND AN INDUSTRIAL  
AIR COMPRESSOR



# FACILITY FEATURES

3 ELEVATORS

ONE FOR DIRTY  
MATERIALS

ONE FOR CLEAN  
MATERIALS

SMALL ONE FOR  
DELIVERY OF  
ANIMALS

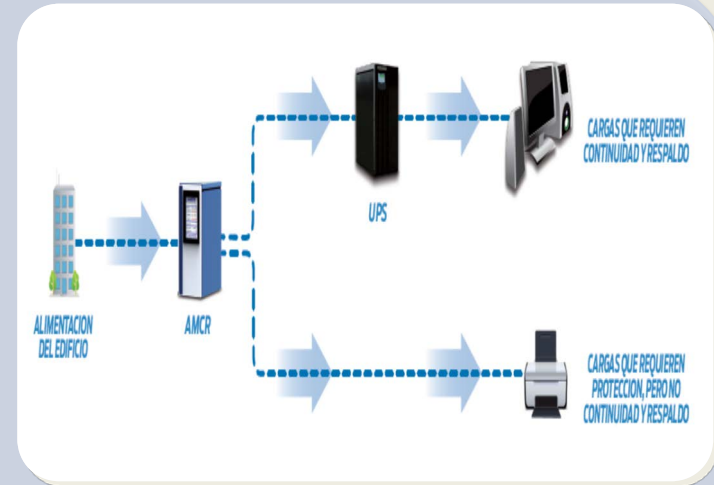




# FACILITY FEATURES

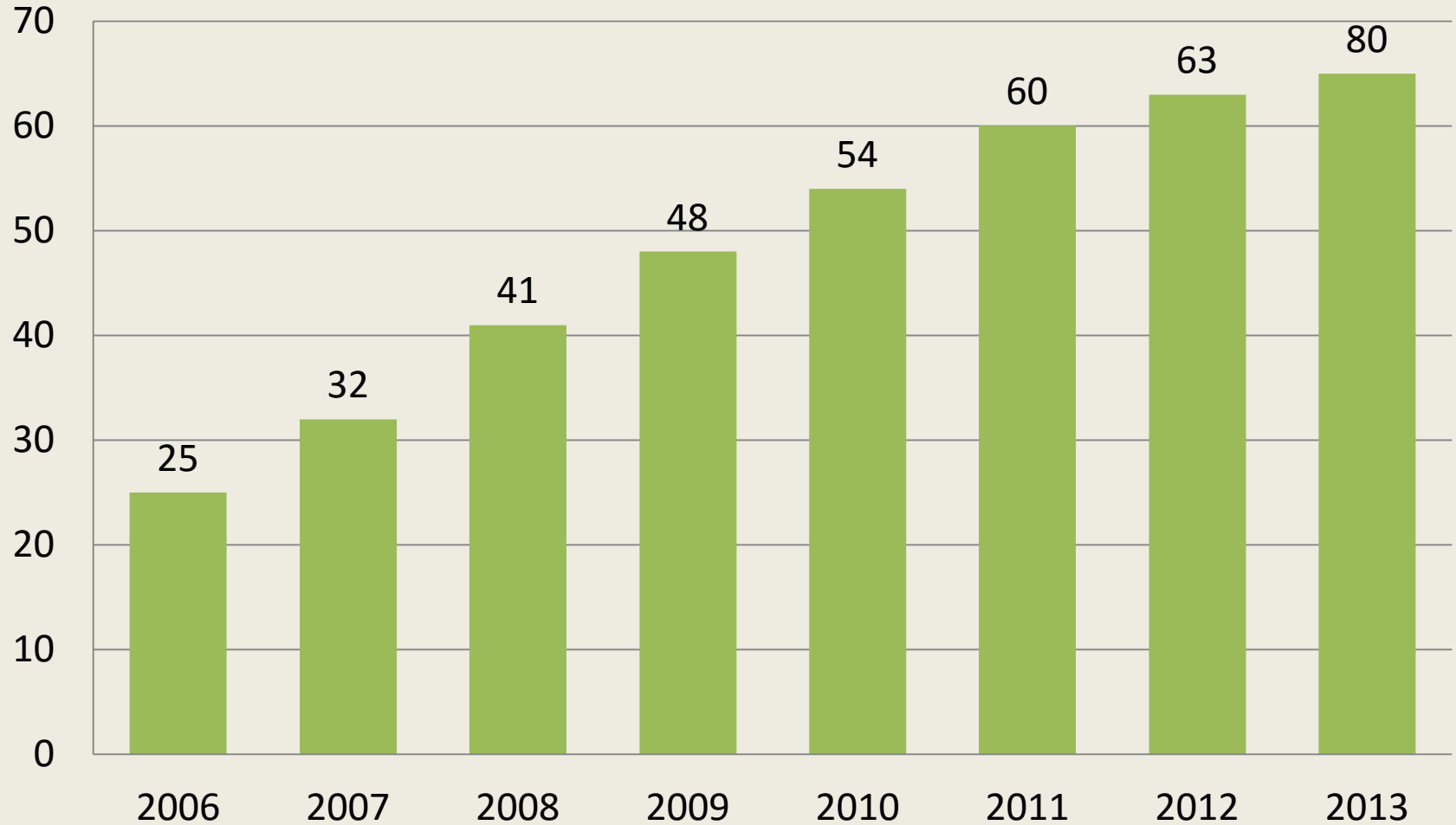
UPS UNIT (20 KVA – 16 KW)  
5 MINUTES BACKUP FOR ALL  
SENSITIVE EQUIPMENT:  
COMPUTERS, ALERT SYSTEM,  
LAB EQUIPMENT, ETC.

OVERLOAD, SHORT CIRCUIT,  
OVER VOLTAGE, AND  
UNDERVOLTAGE, BYPASSING,  
EMERGENCY SHUTDOWN  
AND OTHER PROTECTION  
FUNCTIONS.



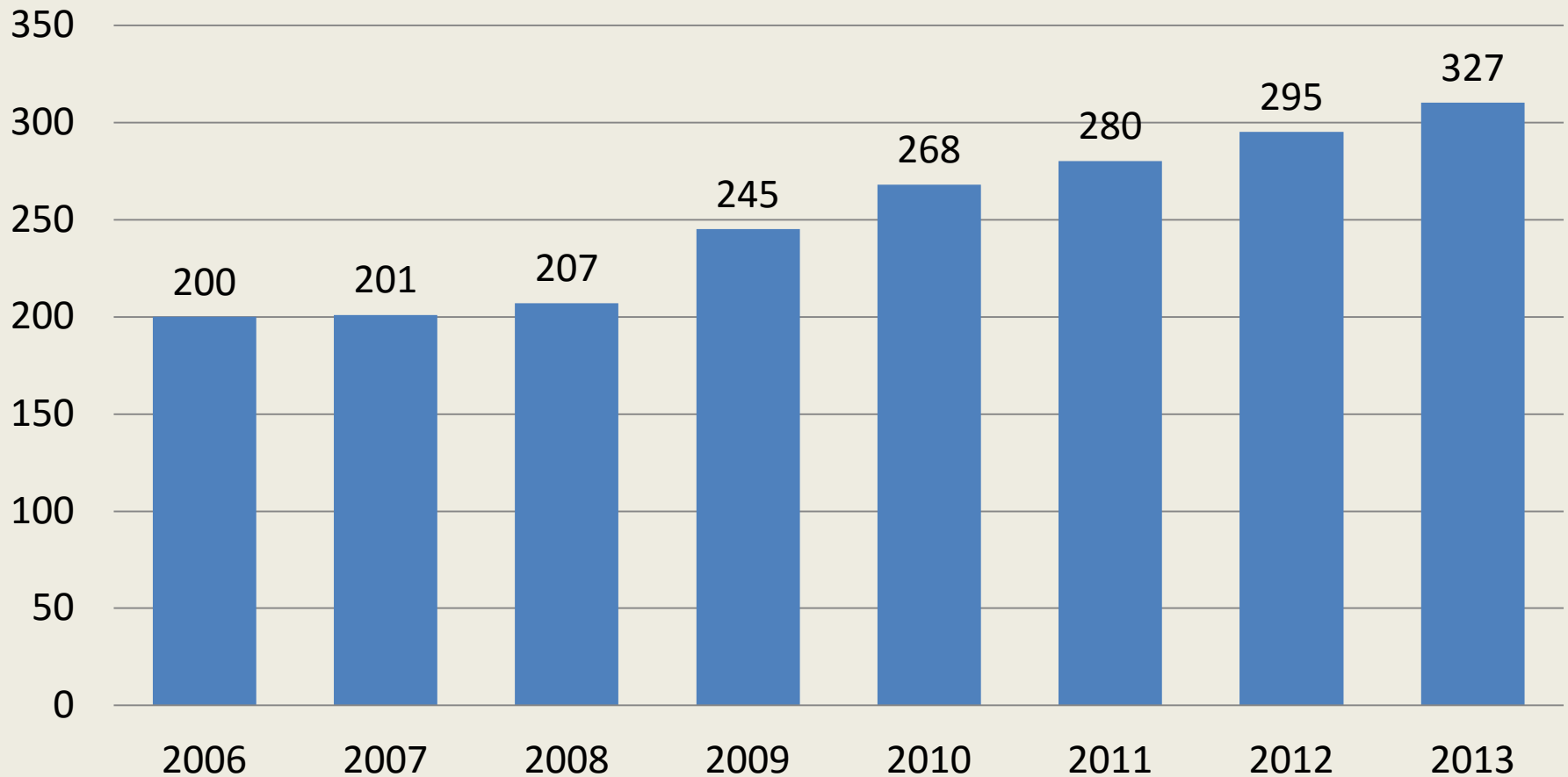
# BENEFITS FOR CINVESTAV

## BIOMODELS IN USE



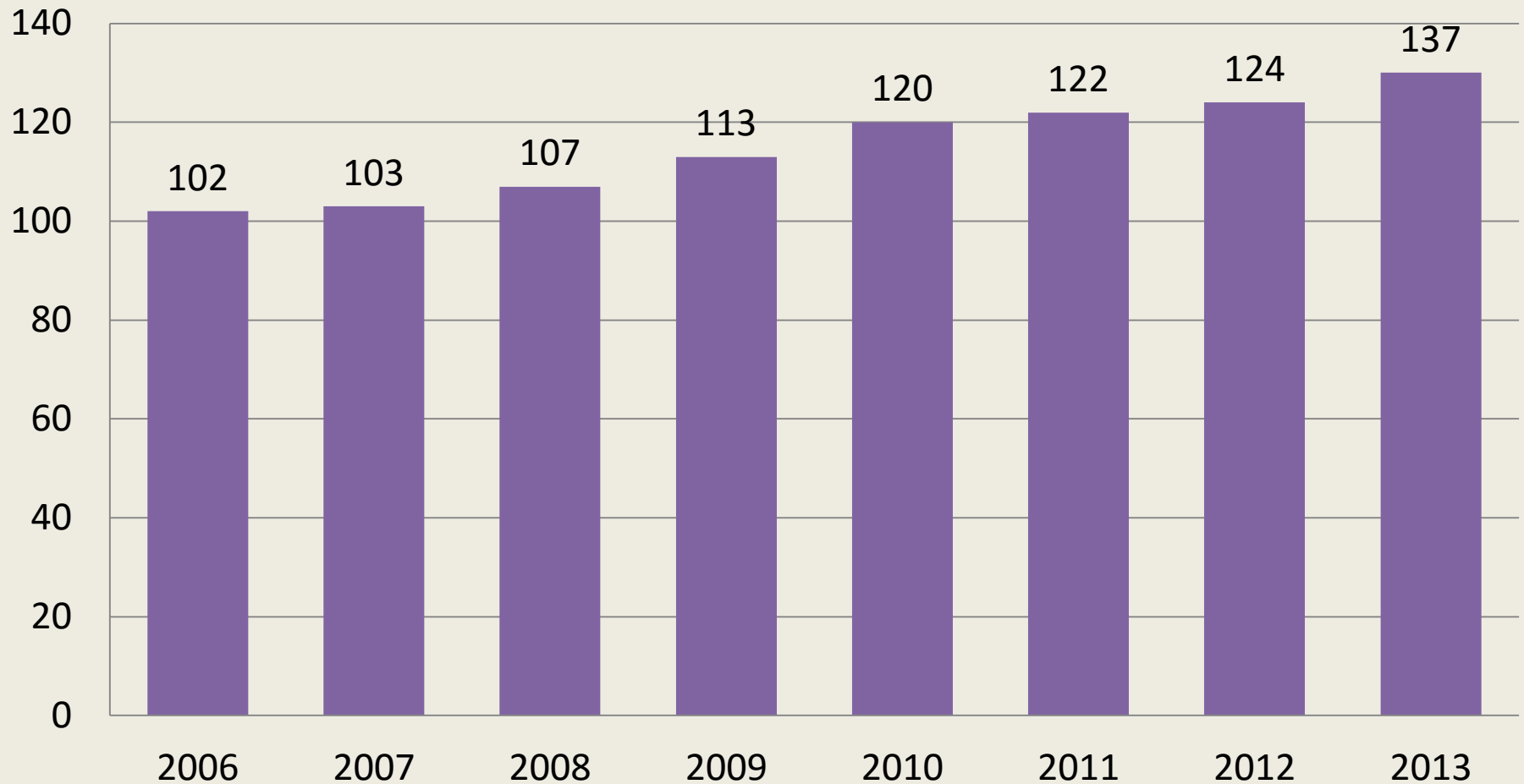
# BENEFITS FOR CINVESTAV

## NUMBERS OF ANIMALS USE PROTOCOLS APPROVED BY IACUC



# BENEFITS FOR CINVESTAV

## NUMBERS OF RESEARCHERS WITH IACUC APPROVED ANIMAL USE PROTOCOLS



# BENEFITS FOR CINVESTAV



ALL 137 RESEARCHERS  
BELONG TO 12  
BIOMEDICAL  
DEPARTMENTS AND 4  
FOREIGN UNITS  
OUTSIDE MEXICO CITY

# BENEFITS FOR CINVESTAV



NOW THERE ARE  
350 PhD AND  
MSc STUDENTS  
WORKING IN  
327 ANIMAL USE  
PROTOCOLS

# BENEFITS FOR CINVESTAV



IN 2011 60% OF  
CINVESTAV'S  
PUBLICATIONS IN  
PUBMED DATABASE  
USED LABORATORY  
ANIMALS PRODUCED  
AT CINVESTAV'S  
ANIMAL FACILITY



# BENEFITS FOR CINVESTAV



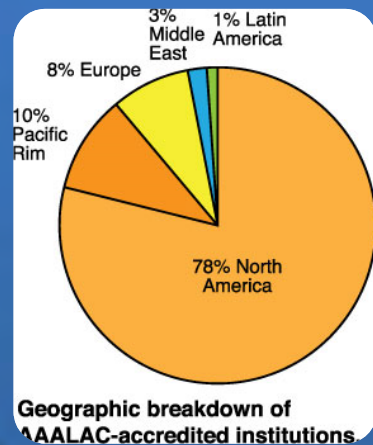
SAME YEAR DATA  
SHOWED THAT 68%  
OF PhD & MSc  
THESES FROM  
CINVESTAV'S  
BIOMEDICAL  
STUDENTS USED  
LABORATORY  
ANIMALS PRODUCED  
IN THIS UNIT

# BENEFITS FOR CINVESTAV



WE ARE BEGINNING  
THE PROCESS TO GET  
THE NMX-CC-9001-  
IMNC-2008/ISO  
9001:2008 LINKED  
TO THE MEXICAN  
NORM 062-Z00-1999  
RELATED TO THE  
CARE AND USE OF  
LAB ANIMALS

# BENEFITS FOR CINVESTAV



ONCE WE ATTAIN  
THIS ISO STANDARD,  
WE WILL INITIATE  
THE PROCESS FOR  
AAALAC  
ACCREDITATION



# ARCHITECTURAL DESIGN

# FIRST LEVEL



MICE BREEDING (Tg, SCID, Nu, KO) 68 DIFFERENT STRAINS /1,280 MICRO ISOLATOR CAGES/6,000 HOUSING MICE  
WASHING, DISINFECTION, STERILIZATION AND EQUIPMENT PREPARATION AREA



6 STRAINS AND STOCKS OF RATS AND OTHERS RODENTS /1,785 MICRO ISOLATORS/6,600 HOUSING RODENTS CAPACITY)

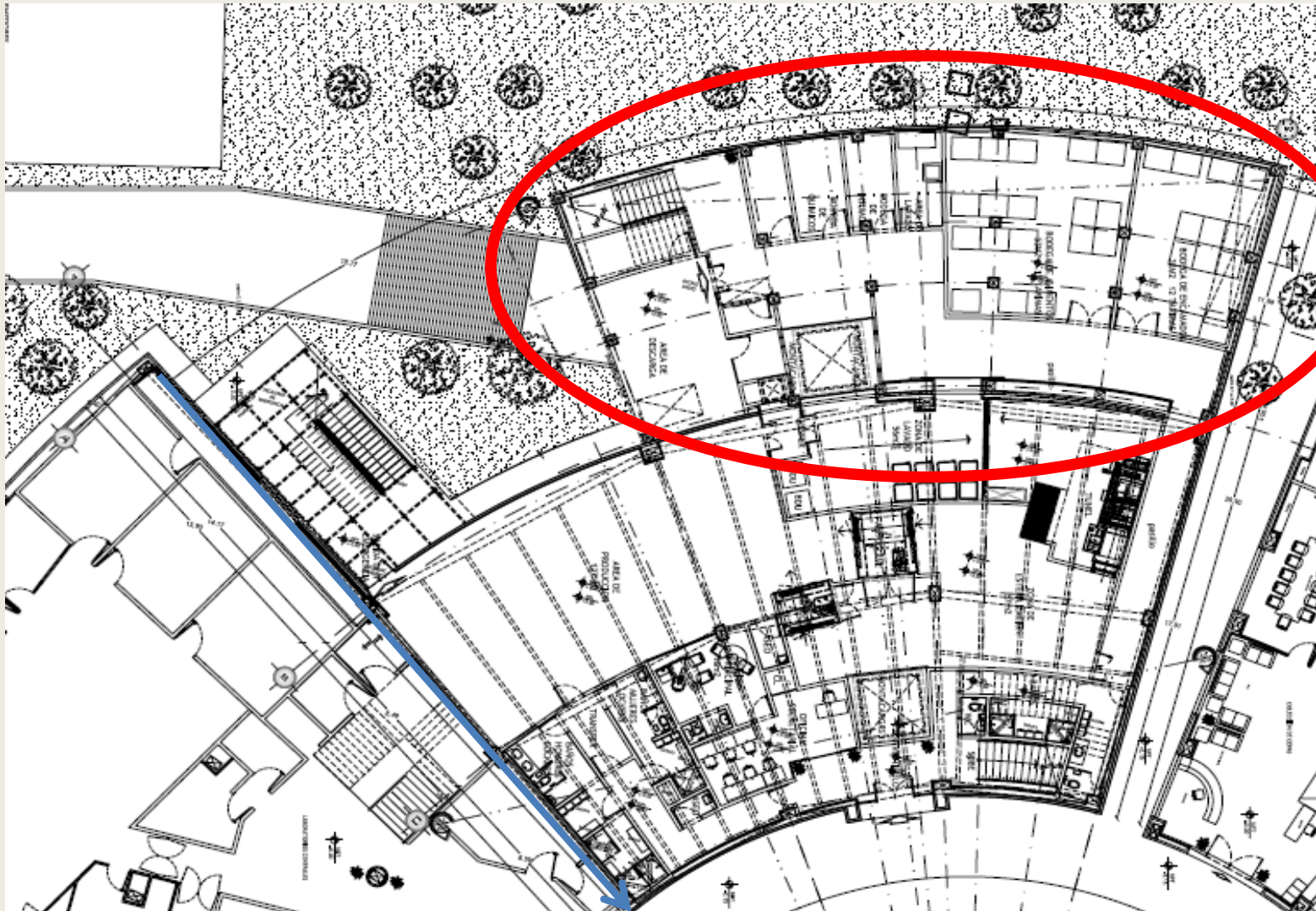
# THIRD LEVEL



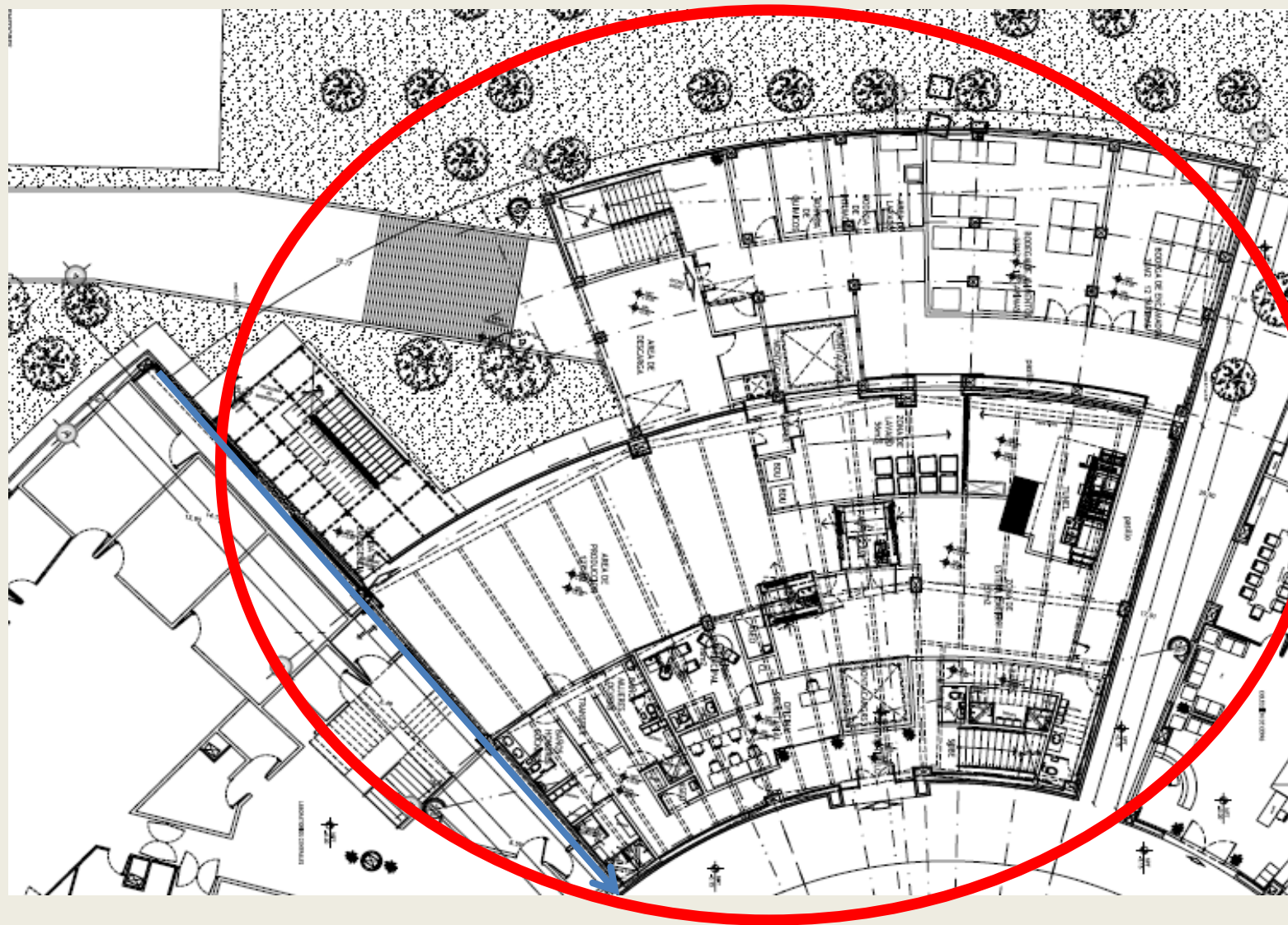
HOUSING RODENTS WITH APPROVED PROTOCOLS (2,935 MICRO ISOLATORS/13,000 RODENTS)



# LAYOUT BUILDING # 2 (IN PROJECT FOR 2015)



# FINAL LAYOUT OF THE ANIMAL FACILITY







UPEAL

**THANKS**