

Intel AZ Manufacturing

Our U.S. manufacturing powerhouse



How the Clean Air Act Allows Facilities to Expand in Non-Attainment Areas

A purple silhouette of the state of Arizona is positioned on the right side of the slide. Overlaid on the map is the text "Years Making Chips" in a light purple font, and "40+" in a large white font below it.

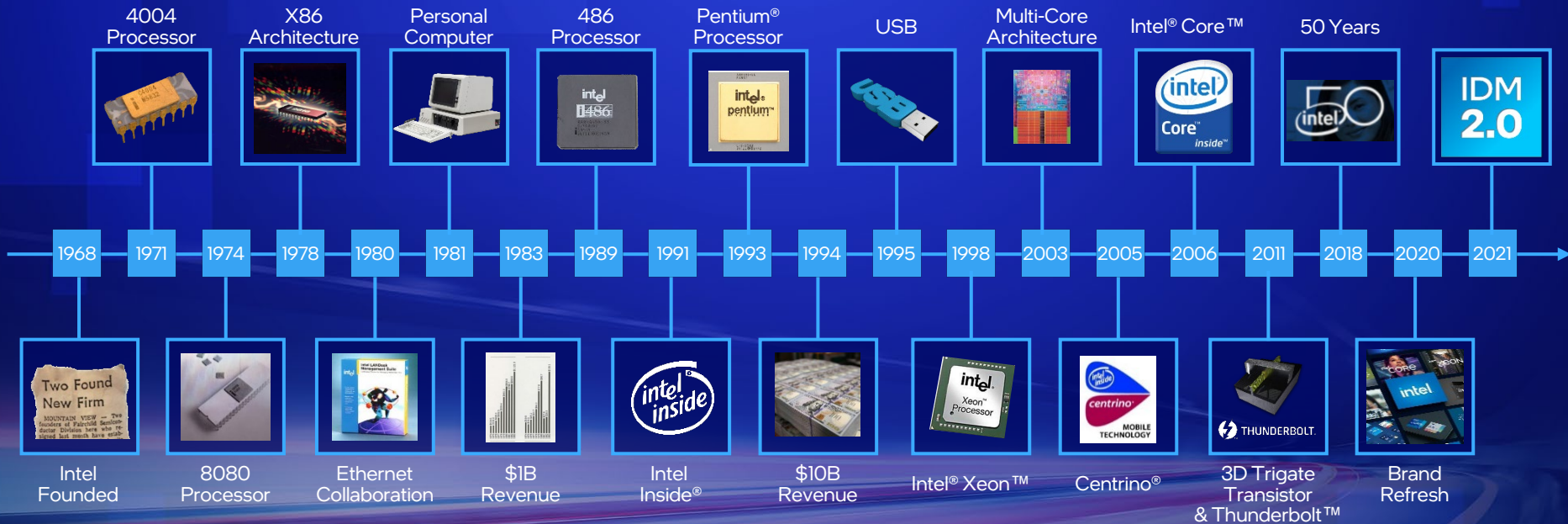
Years
Making Chips
40+

Craig McCurry, P.E.
Senior Environmental Engineer
Ocotillo EHS

AGENDA

- Intel Expansion Background
- Know the Applicable Regulations inside and out
 - Stay up to date; Know how Credits really work
- Map out the Regulatory Pathways to Permit the Expansion
 - Both your site AND any agency actions
- Being Optimistic is a prerequisite
 - Expect to overcome roadblocks
 - Have Contingency Plans in place – you will likely need them
- Engage all Air Agencies Early and Often
 - Work Permitting Requirements in Parallel

Intel Journey



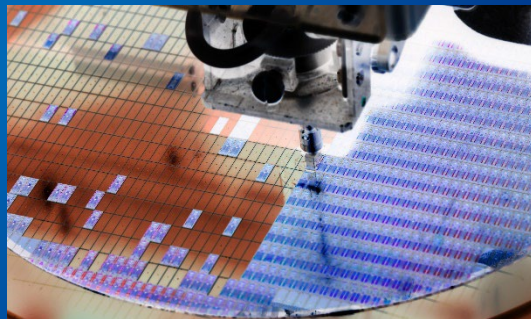
Delivering Leadership Manufacturing: IDM 2.0

Internal Factory Network



Intel's global, internal factory network for at-scale manufacturing

External Foundries



Expanded use of third-party foundry capacity

Intel Foundry



Building a world-class foundry business, Intel Foundry Services

Leveraging Intel's leading-edge packaging & process technology & world-class IP portfolio

Intel & Moore's Law : Silicon Technology

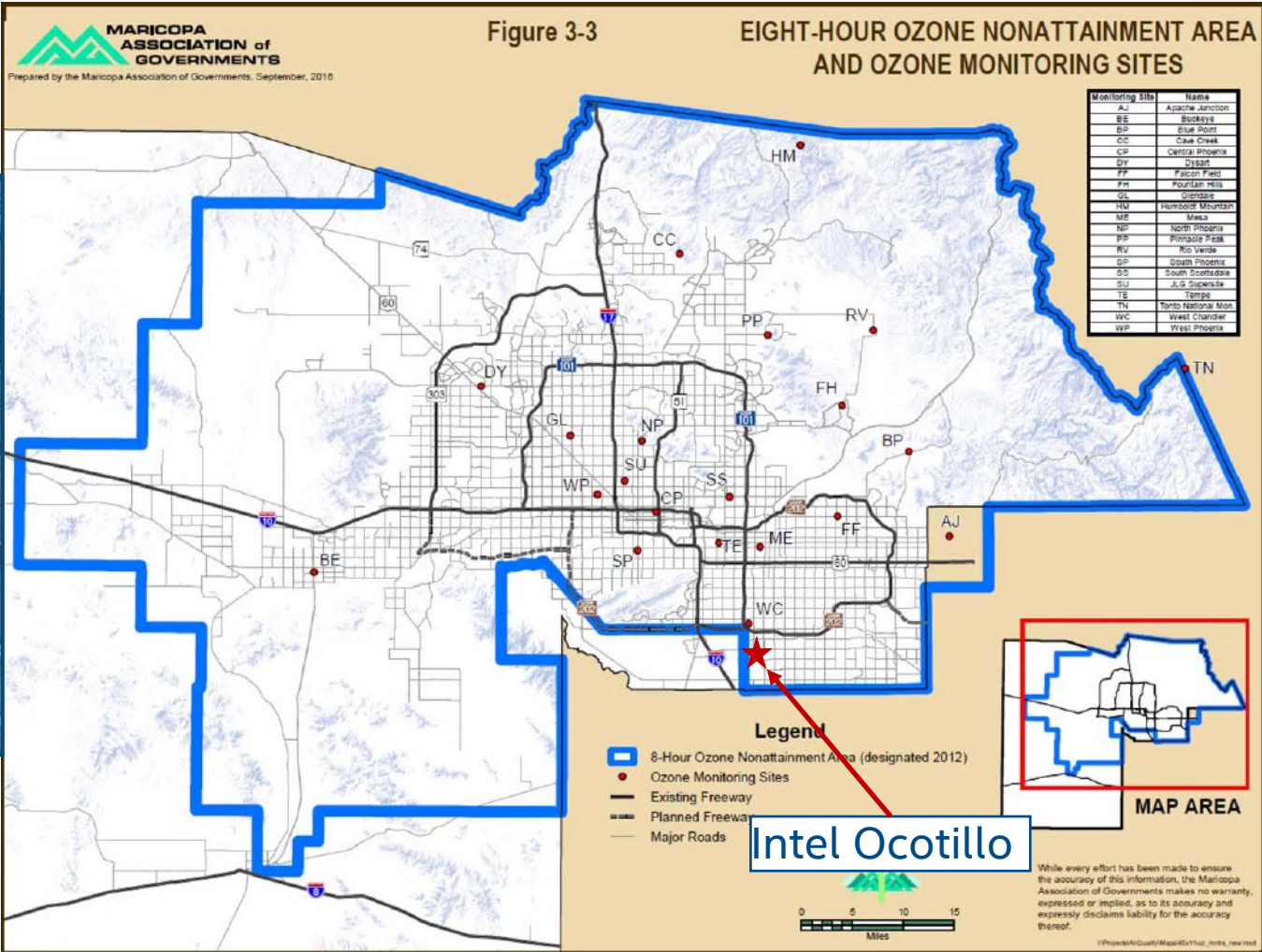


* Select Products Shown. Based on internal estimates. Technology readiness timing does not necessarily indicate product production timing. Learn more at www.intel.com/PerformanceIndex.

Know the Applicable Regulations Inside and Out

- The Basics:
 - Federal & Local Regulations for Major and Minor Modifications
 - Rule 240 – Major NSR Modifications
 - [40 CFR 51 & 52: PSD & NA NSR; Significance Levels & 28 Source Categories](#)
 - Rule 241 – Minor NSR Requirements
 - Rule 204 & Draft 205 Emission Credits
- The Many Details – for example.....
 - What is Attainment Status and will it change before the Permit is submitted?
 - How are Credits Calculated?
 - What are PALs?
 - What is taken into account when Credits are Certified?
 - Do Credits have a shelf life or do they get discounted?
 - Do Credits have to be in the AZ Emission Bank to be purchased?
 - What are typical prices of Emission Credits?
 - Are there precedents that have been set in other Non-Attainment Areas

Ozone Non-Attainment Area



Ozone Overview

Overview of CAA Ozone Nonattainment Area Planning & Control Mandates by Classification

		NSR offset ratio	Major source threshold	Major Modification threshold
EXTREME (20 years to attain)	TRAFFIC CONTROLS DURING CONGESTION	1.5 : 1 Extreme	10	0
	CLEAN FUELS REQUIREMENT FOR BOILERS			
	PENALTY FEE PROGRAM FOR MAJOR SOURCES			
SEVERE (15/17 years to attain)	LOW VOC REFORMULATED GAS	1.3 : 1 Severe	25	25
	VMT GROWTH OFFSET			
	VMT DEMONSTRATION (& TCMs IF NEEDED)			
SERIOUS (9 years to attain)	NSR REQUIREMENTS FOR EXISTING SOURCE MODS	1.2 : 1 Serious	50	25
	ENHANCED VEHICLE I/M			
	CLEAN FUELS PROGRAM (IF APPLICABLE)			
	MODELED DEMO OF ATTAINMENT			
	MILESTONE CONTINGENCY MEASURES FOR RFP			
	3% ANNUAL RFP UNTIL ATTAINMENT			
MODERATE (6 years to attain)	ENHANCED MONITORING PLAN	1.15 : 1 Moderate	100	40
	STAGE II GASOLINE VAPOR RECOVERY			
	BASIC VEHICLE I/M			
	CONTINGENCY MEASURES FOR FAILURE TO ATTAIN			
	ROP (15% RFP OVER 6 YEARS)			
MARGINAL (3 years to attain)	VOC/NOx RACT for MAJOR/CTG SOURCES	1.1 : 1 Marginal	100	40
	ATTAINMENT DEMONSTRATION			
	TRANSPORTATION CONFORMITY DEMONSTRATION			
	REFORMULATED GAS			
	NEW SOURCE REVIEW PROGRAM			
	MAJOR SOURCE EMISSION STATEMENTS			
	BASILENE EMISSION INVENTORY (EI)			
	PERIODIC EMISSION INVENTORY UPDATES			

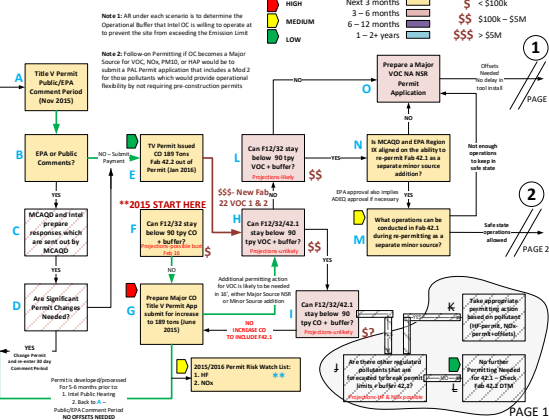
Five Criteria of a Verified Emission Credit

- Before emissions reductions can be converted to marketable offsets, the reductions must first meet five critical, regulatory elements:
- **1) Real** - The emission reductions must be real.
- **2) Quantifiable** - The amount, rate and characteristics of the emissions must be quantifiable.
- **3) Surplus** - Emission reductions must be surplus at the time they are granted and the time they are used.
- **4) Permanent** - Emission reductions must be permanent.
- **5) Enforceable** – The permanence of the emission reductions must be enforceable.

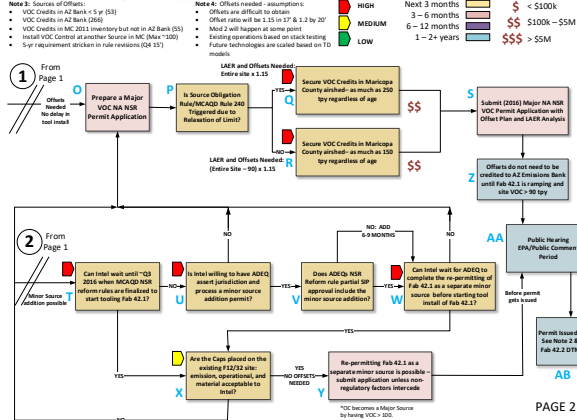
Map Out the Long-Term Regulatory Pathways

- Both for your Facility AND the Agencies (Local, State, Federal)
 - Facility Permitting options – what is gating permitting actions over next 5+ years?
 - Agency Actions – Is SIP approval needed or other EPA involvement?
 - Agencies can move quickly if you engage them pro-actively

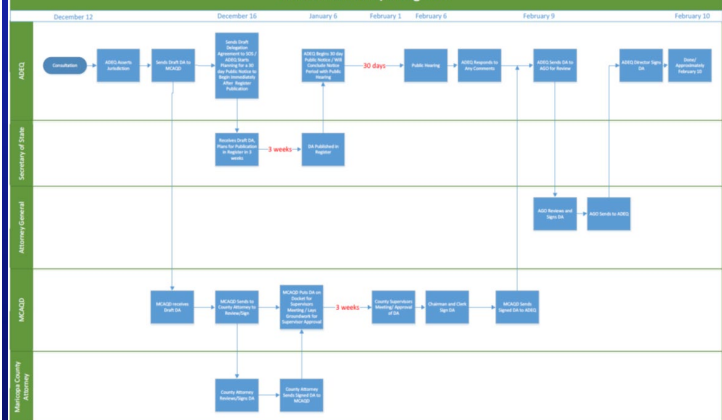
OC Air Permitting Strategy 11/2015



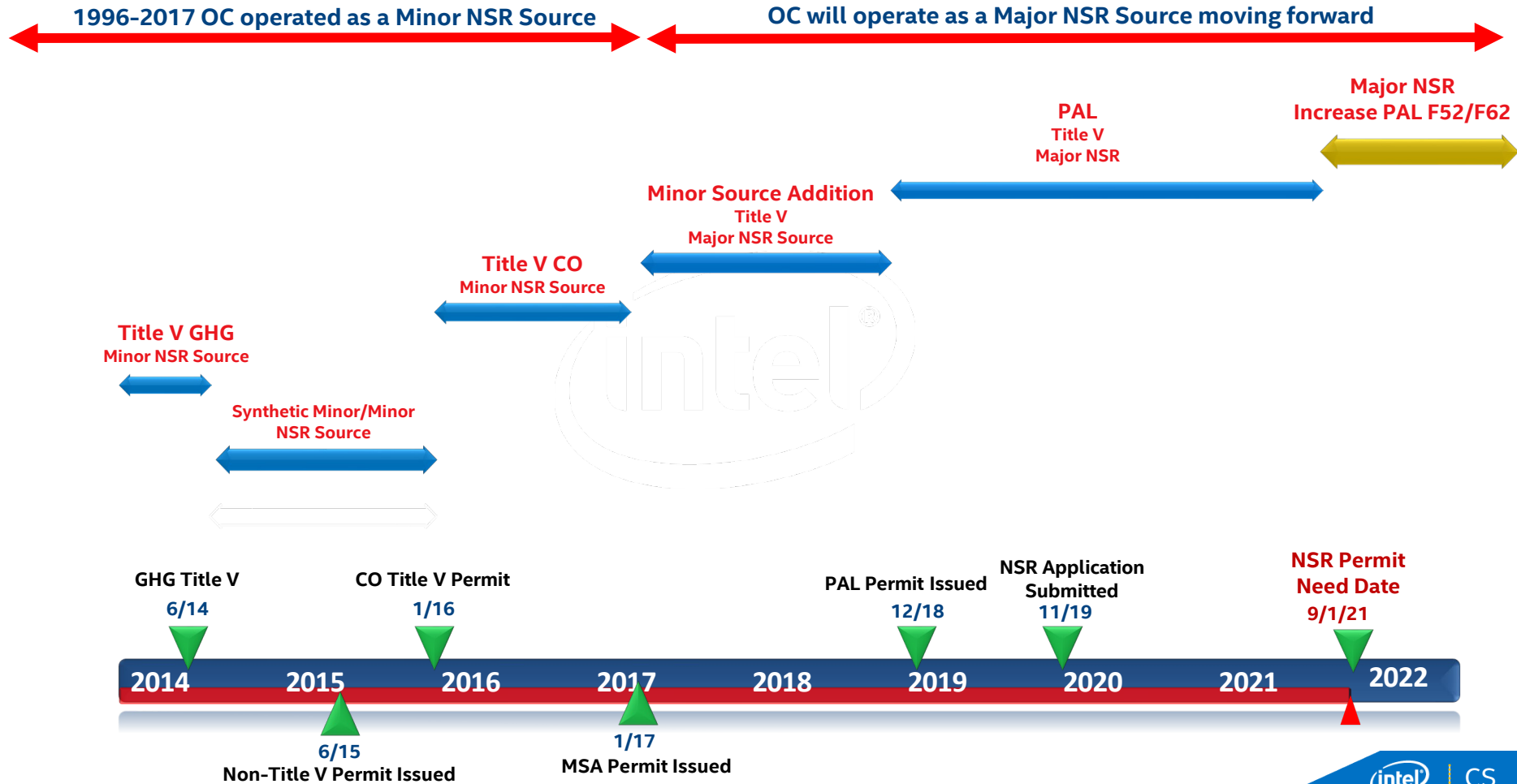
OC Air Permitting Strategy 11/2015



Intel Jurisdiction/Delegation



OC Air Permitting Timeline 2014-2022+



March 23, 2021 Announcement



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TECH

Intel is spending \$20 billion to build two new chip plants in Arizona

PUBLISHED TUE, MAR 23 2021-4:59 PM EDT | UPDATED WED, MAR 24 2021-7:38 AM EDT

Kif Leswing
@KIFLESWING

SHARE    

KEY POINTS

- Intel announced on Tuesday that it will spend \$20 billion to build two major factories in Arizona.
- The news comes amid a worldwide chip shortage that is snarling industries from automobiles to electronics and worries the U.S. is falling behind in semiconductor manufacturing.
- The announcement signals that Intel will continue to focus on manufacturing.

**Mad Money** **WATCH LIVE** 

UP NEXT | **Shepard Smith** 7:00 PM ET [Listen](#)



 **CS**

March 2021 Problem Statement: Project is a GO; Make it Happen

- Need by Sept 1 - Construction start depends on Air Permit Issuance Date
- Inter-precursor Trading of VOC to NOx Credits not allowed due to DC Appeals Court decision in Sierra Club vs. EPA in Feb 21
- No Large Sources had Credits available to trade
- Need 190 NOx Credits and ~15 NOx credits in AZ Bank
- There has never been NOx Credit Trading in Arizona
- Local MC Rule on Emission Credits (204) not in SIP so not Federally Enforceable
- This will be First of Kind Permit in AZ

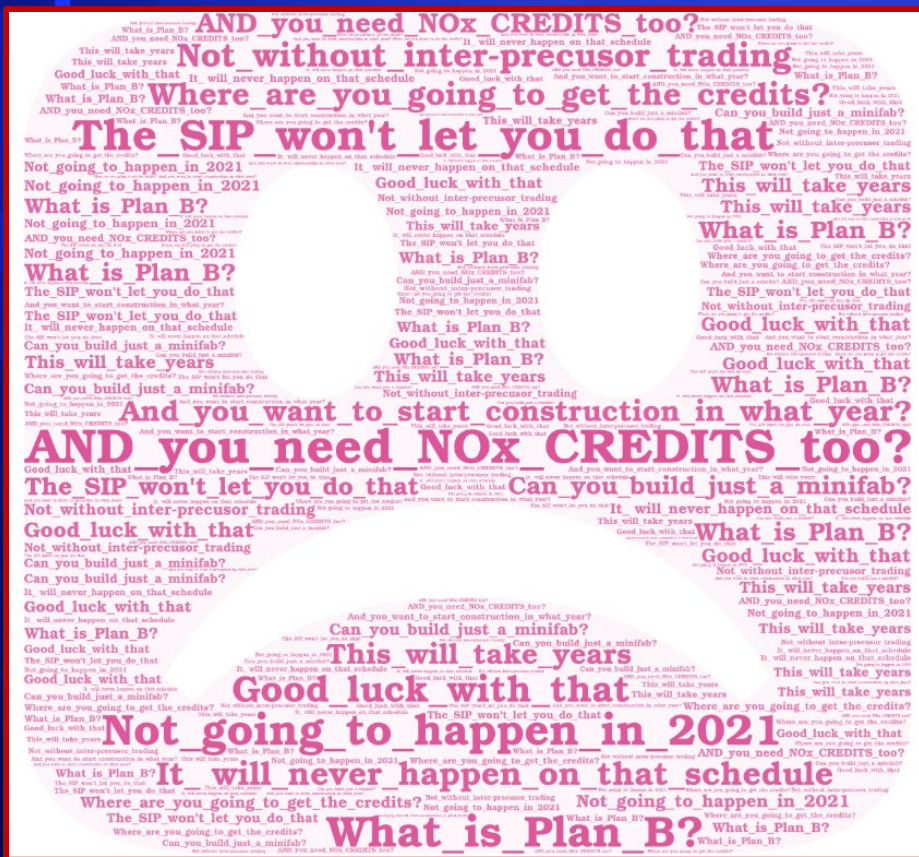
Permitting Requirements Triggered by Pollutant

(40 CFR Part 52.21) Pollutant	Existing PAL	Non-Attainment NSR	Attainment PSD	Minor NSR	New PAL Set	LAER Analysis	Federal BACT Analysis	Minor Source BACT
NO _x	X	X			X	X		
VOC	X	X			X	X		
NO ₂	X		X				X	
GHG			X		X		X	
CO	X			X	X			X
SO _x	X							
Fluorides	X							
PM _{2.5}	X			X				X
PM ₁₀	X			X				X
PMTOT	X							
Lead								
Sulfuric Acid Mist								
Hydrogen sulfide								
Total Reduced sulfur including H ₂ S								
Reduced sulfur compounds including H ₂ S								

PALs set in 2018, ←

- **Non-Attainment NSR:** Lowest Achievable Emission Rate (LAER) controls, Emission Credits to offset new Fabs
- **Attainment PSD:** Federal Best Available Control Technology (BACT) controls, Dispersion Modeling
- **Minor NSR:** Local BACT controls, Dispersion Modeling
- **New PAL Set:** GHG PAL provides site flexibility for future modifications

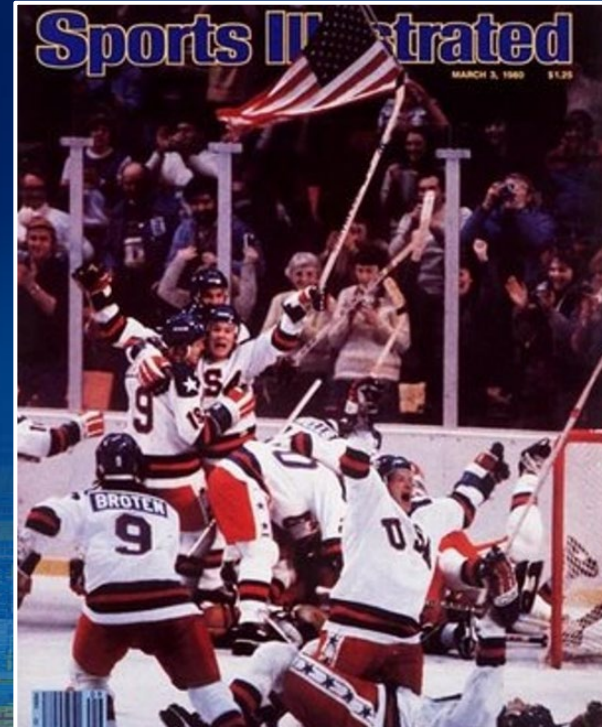
Typical Answers on NA NSR Permitting 2012-2021



NA NSR prerequisite: Must be an Optimist

You will hear "NO" many more times than "YES"

"Great moments are born from great opportunity, and that's what you have here tonight, boys. That's what you've earned here tonight. One game; if we played them ten times, they might win nine. But not this game, not tonight."



“Impossible” is an Opinion not a Fact*

Perception vs Reality; *Does a Regulatory Path Exist?

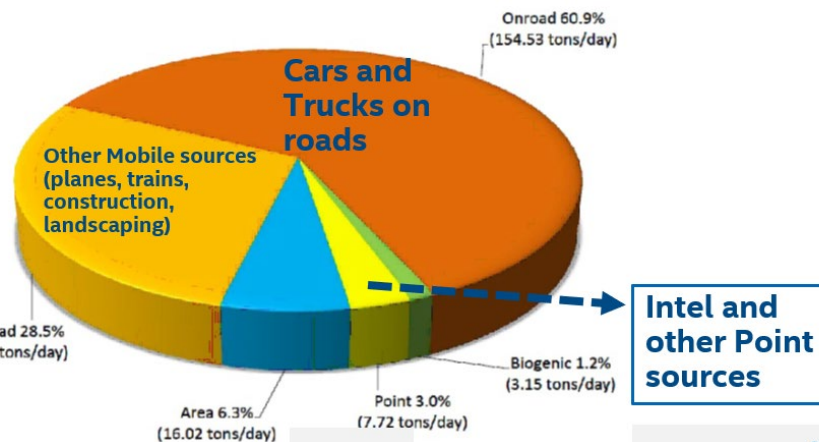
- YES

UNFAIR RULES!!!



Stationary Sources get penalized for Mobile Source Problem

2011 Ozone Season-Day NO_x Emissions = 253.86 tons/day



Engage Air Agencies Early and Often

- Become a “High Maintenance” Source
 - Agencies dictate pace of Permitting
 - There is likely a Learning Curve on Both Sides
- Run an Efficient Permitting Project
 - Work Permitting Requirements in Parallel
 - Control Technology Determinations (LAER/BACT)
 - PTE Emission Inventory
 - Air Quality Modeling (Air Dispersion / Mobile Source Modeling)
 - Obtaining Necessary Credits (likely gating factor)

Intel Ocotillo NA NSR Permit Schedule

Approval & Funding for
Orphan Credits

07/25/18

NSR Application
Submitted

11/29/19

Go on Eagle

02/28/21

Permit Issuance

08/25/21

2018

2019

2020

2021

Agency Engagement

EPA Region 9

Region 9 Site Visit

IPT Meeting
w/MAG

Bi-Monthly Meetings

Purdue Student Pres on
AZ non-traditional
credits

Weekly Meetings

Approval of
MERCs
Approval of Non-
traditional Credits

MCAQD

Fab 42 MSA Approved

PAL Permit Approved

Weekly Meetings

ADEQ

1st Mtg on
Credit Shortage

2nd Mtg on
Credit Shortage

Weekly Meetings

Emission Credits

VOC Credits

VOC Credits 2014-2021

NOx Credits

NOx Credits 2019-2021

NOx Credit Research

Obtain and Validate Credits

IPT Approval

1st MAG photochemical
modeling mtg

IPT Feasibility Analysis

IPT Protocol
Approved

IPT Report
Approved

**EPA loses IPT
Court Case**

LAER/BACT Determinations

2nd MAG
photochemical
modeling mtg

Scrub
VOC

PM

Scrub
NOx

GHG

CO

Final VOC/NOx
LAER

PSD & Mobile Source Modeling Efforts

Met
data

Background
O₃/NO₂

D1X style
fence-line

**Fab
re-design
Final Report**

Final PSD Modeling

Application Updates

Original
Application

Scrubber
VOC LAER

Scrubber
NOx LAER

Final Draft**

Final Application



What did this Permit Enable?

A New Era of Innovation for Intel Arizona

In September 2021 Intel broke ground on two new fabs at our Ocotillo campus, expanding our manufacturing capacity.

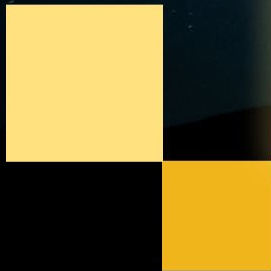
Expected Job Creation:

- 3,000 High-Tech Jobs
- 3,000 Construction Jobs
- 15,000 Indirect Jobs



"Don't be encumbered
by history. Go off and
do something wonderful."

Robert Noyce
Co-Founder of Intel



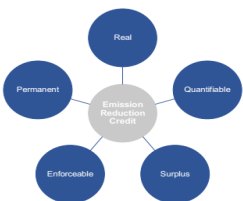
The image features the Intel logo centered on a dark blue background. The background is decorated with a pattern of squares in various shades of blue, some of which are slightly offset or semi-transparent, creating a layered effect. The logo itself consists of the word "intel" in a white, lowercase, sans-serif font. A small, bright blue square is positioned above the letter "i". To the right of the word "intel" is a registered trademark symbol (®).

intel®

Problem Statement

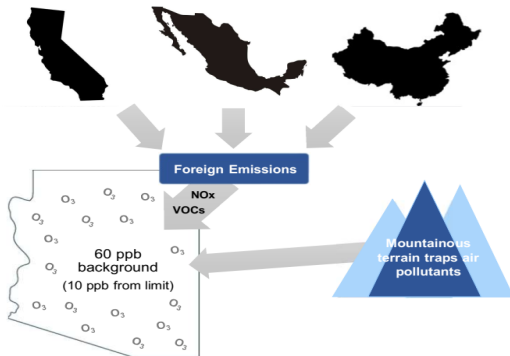
Maricopa County is in **nonattainment for PM₁₀ and O₃**, forcing manufacturers seeking to expand operations to apply emission reduction credits (ERCs) as emissions offsets. The **lack of ERC generation and data availability**, as well as policy constraints **prevent the area from expanding economically and improving air quality** through current ERC and banking systems. The senior design team has been tasked with **providing guidance for the generation of non-traditional ERCs to members of the Arizona Environmental Strategic Alliance (AESA)**. The senior design team has developed a portfolio of solutions for manufacturers to **increase ERC generation opportunities in Maricopa County**.

Project Goals



- Create a portfolio of options for local manufacturing members to generate ERCs meeting five criteria and improve local air quality
- Identify mutualistic relationships between industry, legislators, regulatory officials, and the community to address the challenges of nonattainment status

Environmental Background



Arizona faces high background levels of ozone (O₃) and nitrous oxide ozone precursors (NOx) due to topography, climate, and the transport of foreign air pollution. With these factors contributing to a high ozone background concentration of 60 ppb, manufacturers face strict limitations on emissions to stay within the NAAQS 2015 Ozone Standard of 70 ppb.

Regulatory Background



- Reviews and approves ERC generation applications
- Approves the application of ERCs as offsets for manufacturers

- Operates the Emissions Bank, where ERCs can be listed and sold

- Approves State Implementation Plans (SIP) for those in nonattainment status
- Enforces the Clean Air Act and its programs (NAAQS, etc.)

Maricopa County Rule 204 Emission Reduction Credit (ERC) Generation, Certification, and Use governs ERC policies in area of interest. The generation and use of ERCs is voluntary, as is the banking of the ERCs; however, major sources (manufacturers emitting over 100 TYP) must apply offsets to increase process emissions due to expansions or process changes. ERCs may be banked and sold via the Emissions Bank operated by ADEQ. In compliance with the Clean Air Act, offsets must be 115% of the amount emitted, meaning a greater number of ERCs must be applied than the increase in emissions from the process change.

Comparison to Other States

8-Hour Ozone Nonattainment Areas (2015 Standard)



Arizona is one of many states with areas in marginal nonattainment status for the 2015 8-hour ozone standard; however, it is unique in the challenges it faces due to topography, climate, and foreign pollutants.

Infeasible / Out of Scope

Policy Limited

Truck stop electrification



- Goal: reduce truckstop idling emissions
- Status: policy currently under review
- Implication: no action possible until finalized

Electrification of all area mobile sources



- Goal: Massive emissions reduction from greatest contributor (consumer vehicles)
- Status: Cars leave the county 'permanent' lack of federally enforceable documents not 'enforceable'
- Implication: Policy does not allow approval of these programs as ERC

Low Generation Capacity

Renewable energy transition of manufacturers



- Goal: Generate onsite clean energy, reducing power plant emissions
- Status: Indirectly reduces emissions, thus not 'permanent'
- Implication: Reduces net emissions, but does not meet criteria for ERC generation

Emission reductions at local institutions

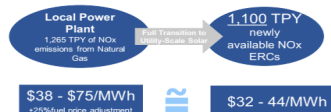


- Goal: Reduce non-industrial operating emissions (universities, prisons, etc.)
- Status: Low emissions
- Implication: Amount of ERC generation not reasonable for large scale

Recommended Solutions

Renewable Energy Transition

Current Energy Source Renewable Energy Source

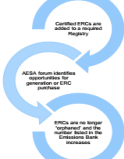


Energy generators are among the top emitters in Maricopa County and have the greatest potential to implement process changes which generate ERCs at valuable levels. The benefit of ERC generation from an increase in energy generators' renewable portfolios is twofold – reductions in emissions can be certified to create ERCs, and these reductions have the potential to be at a great enough magnitude to make meaningful progress towards bringing Maricopa County into attainment status.

Improved Communication & Data Visibility

Improved pollution control equipment is among the most practical options to address short-term lack of ERC availability. Although there are currently credits banked which demonstrate collaboration among manufacturers (i.e. the generator has sold the credit to another manufacturer), there is a lack of information available to both ERC generators and purchasers. Discovery of a credit generation opportunity is rare—a generator must be implementing process improvements, have a working knowledge of the emissions banking and ERC generation systems, and know of a potential purchaser.

This reactive process has not fostered effective use of the emissions bank. A system facilitating partnerships between local manufacturers will improve communication and the banking and sale of traditional ERCs. By improving transparency and communication between manufacturers interested in pursuing, and those with the potential to generate, a mutually beneficial relationship will allow for manufacturing expansion in the short-term.



Policy Improvements

A comprehensive ERC policy addressing both net air quality improvement and the need for manufacturers to generate ERCs for growth must consider policy regarding the offset ratio, generation methodology, and certification process. These three focus areas encompass a diverse set of goals, embody numerous stakeholders, and demonstrate key differences among existing state policies. The following policies goals are proposed to guide legislators in ERC policy improvements:

1. Facilitate net air quality improvements which will bring the state into attainment with NAAQS, and
2. Provide an opportunity for collaboration with regulatory agencies to produce guidance addressing the opportunity for a variety of potential generation strategies to meet the five criteria for an ERC, and
3. Outline certification processes for a variety of potential generation strategies which facilitate greater generation potential and improved data transparency.



Electrification of Local Fleets



Mobile source ERCs is a promising option for manufacturers, as mobile sources contribute nearly 80% of the VOC and NOx emissions in the state. ERCs can be potentially be generated from targeted fleet electrification, meeting the five criteria for ERC generation. The greatest challenge in ERC generation from fleet electrification is the ability of the transition to meet the 'permanent' and 'federally enforceable' requirements.

Numerous fleets are contained in the county boundaries (thus permanent), including garbage trucks, police cars, mail trucks, school buses, and county-owned vehicles.

The AZ Air Quality Senior Design Team would like to acknowledge the following individuals and organizations for their contribution

- Craig McCarthy of AESA
- Richard Sumner of
- Dr. Larry Nies, Dr. Zhi Zou, and Ms. Meg Whelton of Purdue EEE Department
- Arizona Dept. of Environmental Quality
- Arizona Energy Service
- MGA

Responsible Water Stewardship

To support Intel's commitment to achieve net positive water use, we have funded 16 water restoration projects benefiting Arizona. These projects restored more than

800 Million
gallons of water in 2021.

On-site Conservation:

Ocotillo

Brine Reduction Facility, in partnership with the City of Chandler since 1995



On-site Conservation:

Our newest 12-acre water recycling and treatment facility, with the capacity to treat

9 Million

gallons of water per day

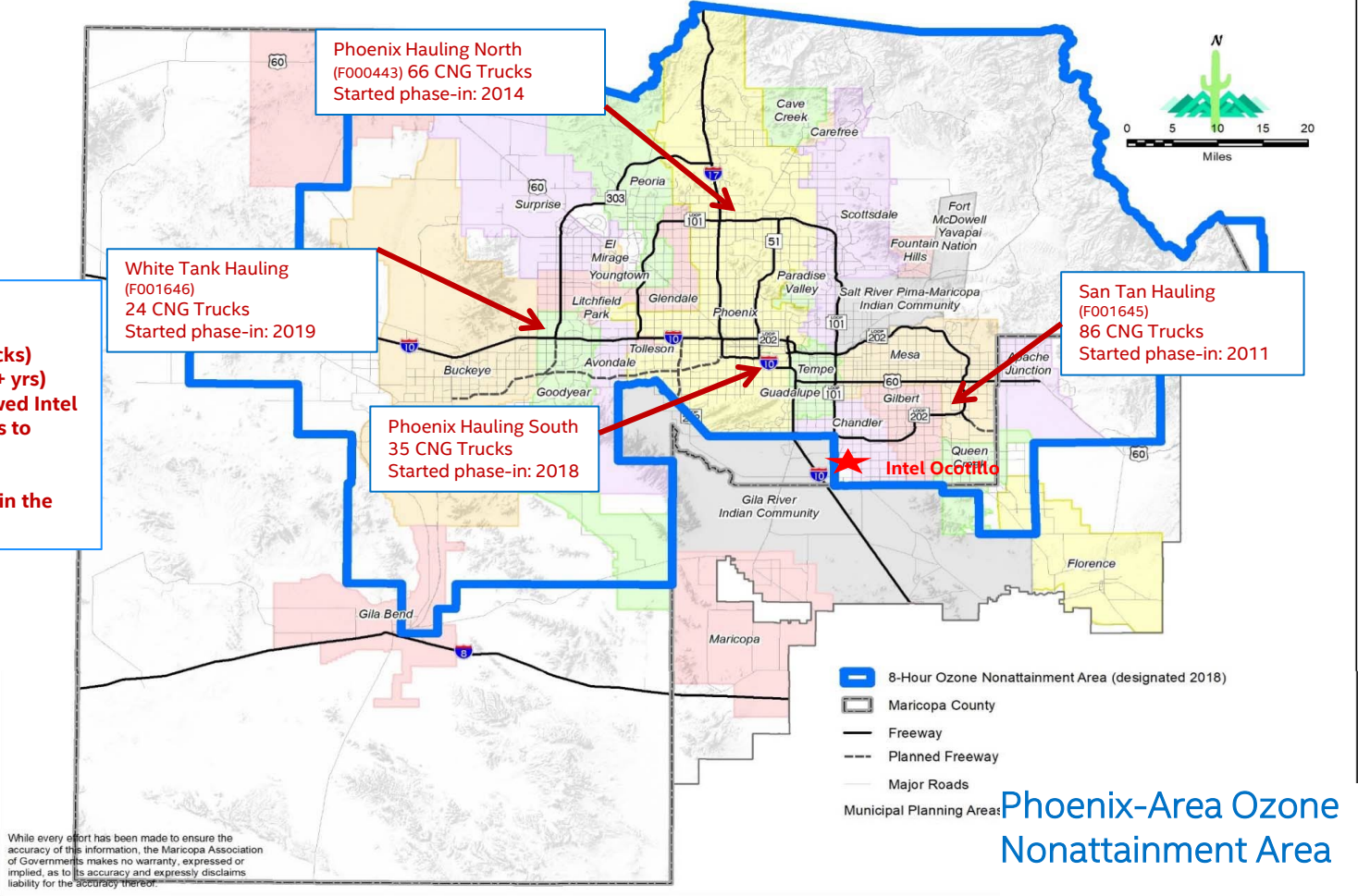
What Did the MERC Program Look Like?

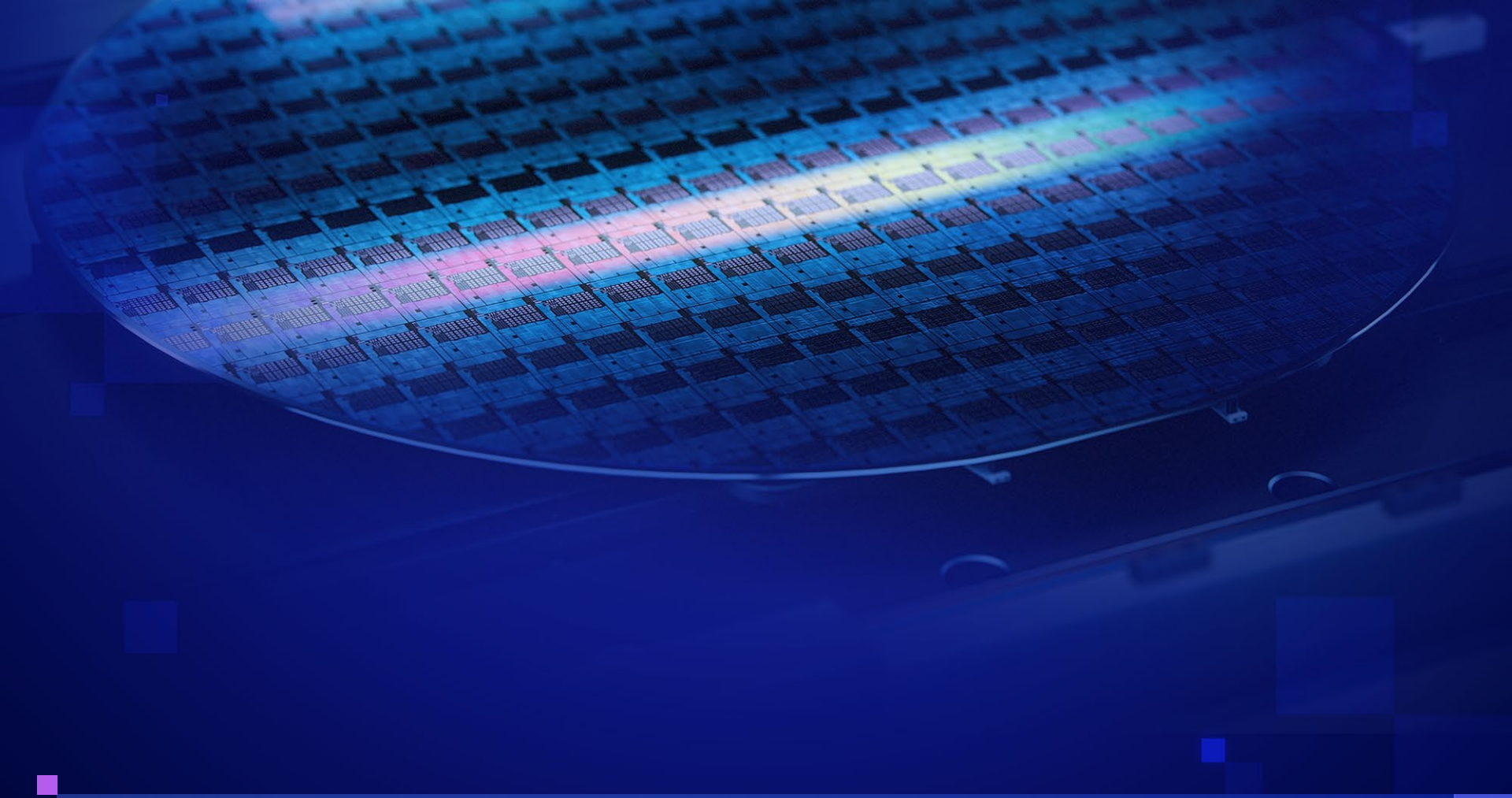
This will go in MERC Roundtable is Coming Up

- Waste Management Mobile Credits (MERCs)**
- 33.6 Credits existing Fleet (225 Trucks)
 - No AZ Rule on MERCs (Rules take 2+ yrs)
 - EPA Office of General Counsel allowed Intel to use Permanent Permit Conditions to meet ERC Criteria
 - In addition, to ensure Federal enforceability, putting WM Permits in the SIP

- ERC Criteria:**
- Real
 - Quantifiable
 - Surplus
 - Permanent
 - Enforceable

Figure 1: Eight-Hour Ozone Nonattainment Area and Municipal Planning Areas





Corporate Overview Deck

Telling Intel's Story

Speaker Name
Title Goes Here

intel®





World-Changing Technology

We create world-changing technology
that improves the life of every person
on the planet