Technical Memo

Subject: Preparation of 2020 Wildland Fire Emissions for the National Emissions Inventory (NEI)

From: Jeff Vukovich
United States Environmental Protection Agency (USEPA)
OAR/OAQPS/AQAD/Emissions Inventory Analysis Group (EIAG)

To: State/Local/Tribal/Federal Agencies and other interested parties

Date: May 6, 2022

This memo is meant to provide a very brief summary of activity data, modeling tools and supporting data used to generate version the 2020 National Emissions Inventory (NEI) dated May 6, 2022. A more detailed technical description will be generated later when the final NEI estimates are released.

Activity Data

National datasets plus a few state-specific datasets of raw wildland fire activity were obtained as inputs for calculating daily estimates of acres burned. The sources of the 2020 non-SLT input activity data are listed below.

- **Incident Status Summary reports (ICS-209)** daily incident report data
  - Derived from the 2020 SIT ACCESS DB available at the FAMWEB website: https://famit.nwcg.gov/applications/FAMWeb
  - Wildfires taken from SIT209_HISTORY_INCIDENTS table
- **National Incident Feature Services (NIFS) (formerly GeoMAC)** wildland fire perimeter polygons
  - Shapefiles acquired from: https://data-nifc.opendata.arcgis.com/
  - Mainly wildfires
- **NOAA HMS (Hazard Mapping System)** satellite detections
  - Initially retrieved as text from: https://www.ospo.noaa.gov/Products/land/hms.html#data
  - Wildland areas separated from agricultural areas using the Cropland Data Layer (CDL) and 120m resolution LandFire v2.0.0 landcover with Fuel Characteristic Classification System (FCCS) version 4 fuelbeds
  - See note below for the crop residue burning emissions details.
- **Forest Service Activity Tracking System (FACTS)**
  - Hazardous Fuel Treatment Activity Polygon data
  - 2020 data subset from the shapefile retrieved from: https://data.fs.usda.gov/geodata/edw/datasets.php
  - Wildfires and Prescribed burns
- **US Fish and Wildlife Service (USFWS)** fire location activity data
  - Sent by USFWS via direct communication
  - Wildfires and prescribed burns on USFWS lands
- **Department of Interior (DOI)** fire activity data
  - Sent by DOI via direct communication

- Prescribed burns only on DOI lands minus USFWS burns

The sources of fire activity and feedback from SLTs used in this version of the 2020NEI are as follows:

STABBV	SLT agency	Wildfire	Prescribed burn	Agricultural burn	Notes
AK	AKDEC	Activity	Activity		
AZ	AZDEQ	Feedback	Activity	Feedback	RX data; AG feedback
CA	CARB		Activity		CARB PFIRS database used
CA	CALFIRE	Activity	Activity		Shapefiles
DE	DNREC		Activity/Feedback	Activity/Feedback	
FL	FLDEP	Activity	Activity	Activity	Didn't include WF on fedlands
GA	GADNR	Activity	Activity	Activity	GA submitting their own emissions
IA	IADNR	Feedback	Activity/Feedback	Feedback	Feedback on all types of burns
ID	IDEQ			Activity	
LA	LDAF	Activity	Activity		
MA	MADEP	Activity	Activity		
ME	ME FS	Activity			Fires on fed lands not included
MT	MTDEQ	Feedback	Activity		RX data; also QA on WFs
NC	NCDENR	Activity	Activity		QA on both types; submitted data
NJ	NJDEP	Activity	Activity		
OR	ORDEQ		Activity		
RI	RIDEM	Activity			
SC	SCDHEC	Activity	Activity	Activity	
TX	TPWD		Activity		Texas Parks and Wildlife Dept fires
UT	UTDAQ		Activity		
VA	VADEQ	Activity	Activity		
WA	WAECY	Feedback	Feedback	Feedback	Various QA/feedback on all 3 types
NV	Washoe Co AQMD	Activity	Activity		
WY	WYDEQ	Activity	Activity		
KS	KDHE		Activity		Flint Hills counties only in KS
OK	KDHE		Activity		Flint Hills counties only in OK

Modeling Tools and Other Supporting Data

Input activity data was processed and reconciled using SmartFire v2.0.33589.1138 to generate daily fire acres by location and type (RX/WF).

SmartFire2 output was processed through the BlueSky Pipeline (BSP) version is 4.2.14 containing CONSUME version 5.0.2 to calculate emissions estimates for the daily fires. The BSP uses a series of modular steps to create the final product. These modules are listed below.

- **Fuel Characteristic Classification System (FCCS)** used 120m horizontal resolution, 2020-compatible Landfire v2.0.0 remap landcover raster data and FCCS v4 fuel bed cross reference information to get the FCCS fuel bed by fire location.
- **CONSUME** version 5.0.2 was used in conjunction with the FCCS v4 fuel loading to calculate biomass consumption by phase.
- **Fire Emission Production Simulator (FEPS)** version 2 applied the emissions factors to the consumption to get total daily Criteria Air Pollutants (CAPs) emissions by fire.

The BSP output was post-processed to create the 2020 inventory.

- The fire locations were geocoded using the 2016 TIGER county boundaries to verify and update the county FIPS for each fire. Fires with locations over water were dropped.

- HAP emissions factors were applied to the total consumption by fire to get HAP emissions.
- Fire emissions were apportioned to flaming and smoldering SCCs so that all emissions associated with the flaming and smoldering phases go to the flaming SCC and all emissions associated with the residual phase is put into the smoldering SCC.
- Crop Residue emissions were computed outside of BSP as follows: Using 2020 HMS detects that were identified as crop residue, acres burned for all crops (except sugarcane) were estimated using the field size by state Table. Emissions were estimated as the product of area burned, combustion completeness, fuel loading and emission factors by each crop type. For sugarcane burning in Texas, Louisiana, and Florida, acres per HMS detect was estimated instead of the field size by state using USDA estimates of sugarcane area harvested with adjustments for green harvesting.
- HAPs emissions factors applied are as shown in section 7 of our 2017 NEI TSD (https://www.epa.gov/sites/default/files/2021-02/documents/nei2017_tsd_full_jan2021.pdf)
- All questions/comments should be addressed to Jeff Vukovich(Vukovich.Jeffrey@epa.gov)